

What Is Good Design?: A Comment

I am fully in agreement with Mr. Hutchings as to the major importance of design in determining the quality of an economy's products. Indeed, I would extend this view to a statement that design is equally important in determining the appropriateness of specific methods of production in the light of the economy's physical and human resources. I think that we are all indebted to Hutchings for making the case and for distinguishing between design and technology. However, while Hutchings discusses the contribution of design to various Soviet industries, he fails to provide criteria for distinguishing between good and bad product design. It is to this elementary task that I wish primarily to direct my remarks.

Product design, in my view, should not be judged by engineering standards but rather by the criteria of the economist. Machinery which is intended to produce in small lot sizes, and thus to suffer considerable idleness due to the need for frequent resetting of the equipment, is badly designed if great expense is incurred in making the machine operate very rapidly. The reverse is the case for machinery intended to operate under mass production conditions and thus to have very little downtime. The proper criterion lies in a comparison of the costs versus the benefits of high-speed operation. Good product design is one which maximizes the difference between the costs and benefits. Thus cost-benefit analysis is the proper framework of analysis.

But cost and benefit to whom? The costs involved in a design which yields a higher engineering performance are borne by the producer. The benefits accrue to the user of the product; in a competitive market economy, these user benefits are in turn passed back in large part to the producer through higher prices for his product and/or greater volume of purchases under conditions where the producer reaps lower average costs through economies of scale.

Thus good design is market-oriented. This is perfectly clear for the producer of machinery and semifinished products: the criterion should be minimization of the average total costs of production to the user, operating under the conditions which in fact characterize his production process. This is equally the case in the production of military products, provided that the military purchaser is concerned with obtaining the maximum amount of military effectiveness for a given budget. The same holds true in the provision of final consumer goods, if we think of the consumer as attempting to maximize the utility he can obtain for a given monetary expenditure.

Competitive market economies do well in promoting good design as measured by the cost-benefit criterion. At least this is the case where the user of the product is economically rational; they therefore do best in compelling and rewarding good design of producer goods. When individual military services and subservices buying military goods make their own purchasing decisions, and when they believe that the budgets they are granted will expand or contract as a function of what is needed to obtain a given number of units of military hard-

ware, military design, even in a market economy, will be poor in the sense of our criterion. But this is because the user is not economically rational in the limited sense of maximizing gross benefits under a budgetary constraint.

Product design in an economy such as that of the Soviet Union might be expected to be very bad indeed. Prices of the product are fixed (or relatively so even today) and cannot properly reflect the advantage to the user of improved technical characteristics. The same is true for the constant prices—or, worse yet, the natural units—in which the producer's volume of sales and output is measured. Since Soviet producers generally have operated, and continue to operate, in a sellers' market, user satisfaction has little effect upon their ability to produce at full capacity. In short, the essential marketing orientation of good design is necessarily missing in the Soviet economy.

Given these circumstances, what impresses me about Soviet design of producer goods is its surprisingly high quality in important respects. Soviet machinery, from machine tools to cars and trucks, has a reputation for considerable sturdiness. This is a major user-oriented characteristic under Soviet conditions of difficulty in obtaining spare parts. Just as American design of equipment has traditionally been "good" compared to West European in its neglect of finishing of outer surfaces and of other nonworking points, Soviet equipment has shown still "better" design. Yet Soviet design, like American, has stressed a high level of finishing and choice of proper chemistry and treatment of metals at the surface of the equipment where these properties matter for operation.

Of course, Soviet design of equipment has been very bad from other points of view. Equipment has been unnecessarily heavy, resulting in waste of metal and high operating costs. Castings have been used far more than in other industrial economies, because the foundry process fits in best with producer convenience under a system of materials allocation. But these deficiencies of design are what we would expect from the absence of market orientation; it is the successes in product design that are worth noting.

As a side comment, it should be noted that up to this point I have been evaluating design from the point of view of society's costs and benefits. If, instead, we evaluated design from the standpoint of the costs and benefits of the producers (who have enormous input into the sort of product-design decisions to which I referred above), the case would be turned upside down. The heavy weight of Soviet equipment would be viewed as representing good design, and its durability as bad design. Since designers are paid and promoted by particular organizations, and not by society as a whole, this criterion of producer cost-benefit analysis is far from being an irrelevant criterion of evaluation.

So much for product design. But process design should also be examined, since this meets Hutchings's criterion of specifying composition and layout of capital investment.

Much of Soviet prewar process design was amazingly effective in terms of cost-benefit analysis and departed radically from American and West European models. Holland Hunter has shown that the railroad system was developed as a crossbreed between the American and West European patterns, and that it was a most felicitous design in view of the Soviet capital shortage.¹ My own study

1. Holland Hunter, *Soviet Transportation Policy* (Cambridge, Mass.: Harvard University Press, 1970).

of metal fabricating indicated an exceptional degree of economizing on investment resources where labor could be substituted for them;² again, this represented a major departure from the foreign models which were adapted to quite different relative scarcities of capital and labor.

As in the case of product design, there were also serious deficiencies in Soviet process design. Where the choice was between investment today versus more investment in the future (for example, double tracking of railroad line where the traffic did not yet require it), the failure to employ an interest rate seems to have had its effects. But I think that the successes outweigh the failures.

Indeed, despite the fact that ideology acted as a bias toward poor process design while it had less such effect on product design, one might well have expected that good process design would have been easier to attain than good product design. This is because the orientation to the customer's needs is much more important in the second case than in the first. In the first case, unlike the second, the user (particularly at the ministerial level) has a considerable degree of control over the design. I would say that the results, at least the prewar results, are in line with our expectations.

As a final comment, I would like to indicate that not all of Hutchings's distinctions between design and science and/or technology are clear to me. For example, Hutchings describes Lysenkoism as an encroachment of science upon design. I would have thought, instead, that both Lysenko and traditional botanists such as Valilov shared a common design objective: to choose, and properly modify, the types of plants most appropriate to the various natural conditions of the Soviet Union. They differed as to how this objective might be met. This would seem to be, as it has customarily been thought, a disagreement over scientific matters—even if, as Joravsky argues, there was little scientific methodology on one side of the argument.³ The concept of design does not seem to me to be at all helpful in understanding the dispute or its implications.

2. David Granick, *Soviet Metal-Fabricating and Economic Development: Practice versus Policy* (Madison: University of Wisconsin Press, 1967).

3. David Joravsky, *The Lysenko Affair* (Cambridge, Mass.: Harvard University Press, 1970).