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Notes Toward the Collection of Capacity Utilization Data  
for Philippine Manufacturing

by

Romeo M. <sup>Marulo</sup> Bautista, 1941-

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Romeo M. Bautista\*

The National Economic Council is currently planning to undertake, in cooperation with the Bureau of the Census and Statistics, a comprehensive survey of capital utilization among manufacturing establishments in the country. Such undertaking is of considerable interest (and long overdue!) especially since the findings of the survey will be examined and evaluated in the context of the industrialization strategy contained in the current Four-Year Development Plan (FY 1972-75). Although initially intended as a supplementary survey on Philippine manufacturing industries, it is hoped that it can be merged eventually with the Annual Survey of Manufactures, which will then provide an annual source of information on industrial capacity utilization in the Philippines, as is currently the case, for example, with the Annual Survey of Industries in India.

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\*The author serves at present as Consultant at the National Economic Council, but views expressed in this paper are his sole responsibility and do not necessarily agree or disagree with those of the Council.

This paper is prepared as background material for the survey. Certain issues will be discussed which are relevant to the formulation of the survey questionnaire and to the nature of the policy implications that can be expected from the findings. It would also seem necessary to emphasize the seriousness of the problem of capital underutilization in the manufacturing sector by making some rough calculations on the benefits foregone due to the existence of industrial excess capacity.

#### Benefits from full utilization of capital

As the literature on capacity output abundantly illustrates, any measure of capacity utilization cannot lay claim to being both conceptually beyond criticism and very practical to implement operationally. Such difficulty, however, pales in significance compared to the urgent need to understand the apparently paradoxical phenomenon of underutilized capacity in a capital-poor economy and to do something in the way of economic policy to promote greater utilization of installed capital equipment and machinery.

The magnitude of the wastage problem associated with the existence of excess capacity can be seen from a consideration of the divergence in 1961 between actual output and the level of production desired, given the

prevailing input and product prices, by manufacturing producers. For the moment, let us define excess capacity to be such deviation of actual production from the desired level. As will be stressed later, desired output is not some absolute maximum level determined solely by technological factors (what some people would associate with capacity output instead).

The source of information is my own sample survey of capacity utilization <sup>1/</sup> in the "large" manufacturing establishments (employing ten or more laborers) conducted six years ago through the Bureau of the Census and Statistics and relevant data from the 1961 Economic Census. The results of the survey disclosed average ratios of actual to desired levels of production ranging from 47 per cent to 90 per cent for two-digit ISIC industries. One implication is that, if it had been possible to raise by one per cent the rate of capacity utilization in each two-digit industry, the overall effect on manufacturing output, assuming strict proportionality between utilized capital and production output, would be an increase in value by P59.9 million (in 1961 prices).

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<sup>1/</sup> Reported in my PEJ article /-1-7 and discussed at length in /-2-7.



The really interesting possibility to consider is where producers had been most fortunate in having actual production match the desired levels, achieving therefore "100 per cent capacity utilization." In such a case, the value of manufacturing output would have been higher by P1,828 million, or by 43.9 per cent of the actual value in 1961. Assuming a fixed value added ratio (to value of output) of .461 based on the actual figure for 1961, it would have meant ceteris paribus an increase in national income by about P842 million, approximately 6.8 per cent its actual value in 1961.

It is to be noted that such increases in output are obtainable in principle without any cost in terms of the real resources of the economy, namely, capital and foreign exchange. Additional saving does not have to be generated and there is no need to set aside scarce foreign exchange to import capital equipment and machinery because the latter have already been purchased and installed. It is not entirely without basis therefore that people tend to associate low levels of capacity utilization with industrial inefficiency. In a capital-poor, foreign exchange-constrained economy it does constitute a most visible manifestation of resource wastage.

There are additional social benefits from greater utilization of existing capital. Employment generation comes automatically and, in the Philippines where the unemployment problem is severe, achieving a higher level of employment probably has an income redistribution effect; it is unquestionably a simple and efficient way of mitigating the extreme poverty of families in the lower end of the income scale. Considering again the 1961 excess capacity in the manufacturing sector, we may infer that if all firms had operated at full capacity they would have employed an additional 111 thousand laborers<sup>2/</sup>. While this represents only about 15 per cent of the openly unemployed labor force<sup>3/</sup>, alleviation of urban unemployment would be to a much greater extent in view of the concentration of organized manufacturing activities in urban areas.<sup>4/</sup>

Finally, as Winston has recently emphasized [57], any change in capital utilization has more than just once-for-all effects. Because it substitutes for increases in saving rates and/or capital productivity, an increase in utilization rate can also be expected to increase the rate of growth of the economy in subsequent periods.

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<sup>2/</sup> Assuming fixed labor coefficient in each two-digit industry.

<sup>3/</sup> Based on the May-October average unemployment from the 1961 BCSSH Surveys.

<sup>4/</sup> Rural-urban breakdown of results of the BCSSH Labor Force Surveys is available only beginning 1965.

The inferences made above about the possible consequences of a hypothetical full capacity operation in manufacturing (in the sense specified earlier) should of course be taken cum grano salis. Apart from the assumed proportionality between output and factors, it appears unlikely that market expectations of producers can be fully realized to enable them to produce at desired levels, i.e. at 100 per cent utilization of existing capital. This is due in part to interindustry relationships expressed in terms of forward and backward linkages (which are strong among manufacturing industries). Although such linkages provide in fact the mechanism for the simultaneous expansion of industrial output, it does not seem likely that expected or desired levels of output by producers in the different industries will exactly match the pattern implied by the structural interdependencies. Nevertheless, considering the benefits from higher levels of capital utilization, it seems clear that producing close to full capacity is desirable from both the private and social points of view.

Before anything can be done policywise to induce greater utilization of industrial capital, it would seem necessary to look into the causes of underutilization of existing capital equipment and machinery. The reasons cited in industry studies in the less developed countries are varied though not unrelated: lack of raw material



inputs (especially imports), shortage of skilled labor, inadequate demand, competition from imports, overcrowded industry, uneconomic scale of operation, etc. Each represents a shortage in either input supply or product demand. Clearly, only a proper identification of the specific factors that bear heavily on the capital utilization problems of each individual industry could provide the necessary guide to a rational policy or planning effort.

An attempt has been made elsewhere [37] to correlate the average rate of capacity utilization among two-digit manufacturing industries in 1961 with various combinations of about ten explanatory variables previously shown to influence the degree of industrial capital utilization in other countries. It suffices to mention here that the regression exercise has not been successful in explaining a large part of the variation of utilization rates, presumably on account of the high level of aggregation and other data limitations. A strong case can be made therefore for additional information-gathering to further our understanding of the problem of excess capacity in Philippine manufacturing.

#### Alternative interpretation of capacity utilization

The collection of new data through a sample survey always requires the commitment of resources having



opportunity costs that must be equalled at least by the benefits to be derived from the undertaking, which in turn is dependent on the extent to which the information needs for policymaking are met. Much thought should be devoted therefore to the decision on the kind of information to be elicited from the respondents of the survey, in the present case, manufacturing establishments.

Mention has been made earlier on an alternative way of defining underutilization of capital. Thus far, we have taken the conventional view, developed in the advanced countries, that the deviation of actual production from the desired level of output constitutes excess capacity. It stems from unanticipated difficulties in product demand and/or supply of inputs, to use the apt terminology of Winston [7]. It is well known, however, that capital equipment and machinery are left idle part of the time on account of the anticipated characteristics of the market. For example, "building ahead of demand" in industries subject to economies of scale would imply some expected excess capacity (at least in the early stage) which is built in the investment decision. So would be the case where the market is characterized by regular peak-load demand cycles (e.g., electricity generation) and seasonality of input supply (e.g., sugar cane milling and other agriculturally-based industries). To be exhaustive one

should also include as a source of anticipated excess capacity the day-night dichotomy in labor availability and pricing, less evident as a factor in capital underutilization but which is actually responsible for a large portion of the total time that installed capital equipment and machinery remain unutilized.

Within such anticipated constraints in production there is some optimal (desired) level of output to be aimed at but which may not be achieved in actuality because of unanticipated changes in market conditions as discussed earlier. The concept of capital utilization used so far has to do with the extent to which actual production approaches the desired level rather than the maximum technologically feasible. The question that arises is: Shouldn't the critical scarcity of capital in the less developed countries suggest an interpretation of capacity utilization that considers the technological maximum level of production as full utilization? As Winston has cogently argued [5], development policy should be concerned not only with correcting the divergence of actual production from the desired level but also with raising the latter to the maximum by the reduction of obstacles (provision of incentives) in order that intended capital underutilization is minimized. Such distinction is significant in view of recent suggestions that anticipated capital idleness

represents the more important contribution to the observed excess capacity even in the developing economies 157.

There is at present no available information that could provide the basis for determining the maximum extent to which our manufacturing industries are capable of increasing output, given the existing stock of capital, if industrial policy were made conducive to greater capital utilization. The presumption has to be that the benefits in terms of higher output, employment and growth would be considerable; the results of the earlier calculations based on a less stringent definition of excess capacity would certainly be magnified.

On the measurement of capacity utilization so defined, obtaining the length of time that capital is in use (relative to the period of "continuous" operation with allowance for the normal time of repair and maintenance) seems a more manageable task than the determination of actual output relative to the maximum attainable, in view of the likelihood of different product-mixes among different establishments belonging to the same industry and temporal changes in product-mix of even the same establishment. Such proportion of time as a measure of capital utilization has the added advantage of being easier to compare among different industries, in different countries and at different time periods. That <sup>it</sup> is also an imperfect



operational measure can be seen from the ambiguity introduced by changes in the intensity of capital use over time and differing levels of utilization among the various components of capital equipment and machinery within the same plant.

In exploring the scope of economic policy in influencing capital utilization,<sup>5/</sup> it is clearly necessary to establish first a data base on which reformulation of existing policies must be premised. One cannot but agree with Phillips that "it is far more important for the less developed nations to find out why scarce capital is underutilized than it is to find out the precise degree of underutilization" [4, p. 157]. That is why a survey of capital utilization is essential; it can assess the extent of underutilization and inquire into the specific causes of capital idleness in the different industries. The latter information need for policy formation in the less developed countries none of the other well-known techniques of measuring capacity utilization developed in the advanced economies can provide.<sup>6/</sup>

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<sup>5/</sup> Some possible areas of policy which have direct relevance in dealing with problems of capacity underutilization in the less developed countries are discussed by Winston [5].

<sup>6/</sup> See [4], pp. 11 ff.

Suggested questions for capital utilization survey

It would be most useful if the survey can provide information on how far the desired level of capital utilization differ from the maximum that could be attained. Moreover, the deviation of actual utilization from the desired level should also be disclosed by the survey results. Finally, and most importantly, the specific reasons for the divergences among the three utilization levels (actual, desired and maximum attainable) in each responding establishment should be established. Clearly, the nature of the policy implications of the findings of the survey will be determined by the relative importance in the existence of excess capacity of anticipated/un-anticipated difficulties in product demand/input supply.

The three sets of quantitative data on capital utilization can be expressed in either quantity (value) of product(s) or the length of time that capital is in use. There are limitations in either one and hence for cross-checking purposes both measures should be used in eliciting information from sampled establishments. Accordingly, the following questions are suggested for inclusion in the capital utilization survey questionnaire:<sup>7/</sup>

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<sup>7/</sup> Some items are adopted from 1-6-7.

A. Actual production data

1. List the value and quantity of each of the principal commodities produced in your plant last year.

2.a. In a typical day of plant operation last year, what is the number of hours that your capital equipment and machinery were actually in use?

b. In a typical week of plant operation last year, what is the number of days that your capital equipment and machinery were actually in use?

c. How many weeks did you operate your plant last year?

B. Desired (optimal) production data

Suppose there were adequate demand for your product(s) and adequate supply of raw materials, supplies, labor skills and other inputs last year at the prevailing prices with no delays in managing output sales and input purchases.

1. How much (quantity and value) would you have produced last year?

2.a. How many hours a day would you have operated your plant last year?

b. How many days a week would you have operated your plant last year?

c. How many weeks would you have operated your plant last year?



3. What are the reasons for the difference between your answers in A-1,2 and B-1,2? (Be as specific as possible.)

4. If wage rates for laborers working at night were the same as those working at daytime, by how many more hours in a typical day would you have operated your plant last year?

C. Maximum production data

1. How many hours in a week of continuous operation must your plant be shut down for maintenance and repairs? (With unbalanced plant operations, your answer should be based on the maintenance and repair of bottleneck equipment or machinery.)

2. Must you shut down your plant continuously for more than a week each year for maintenance and repairs? For how long and why?

3. What factors would prevent you from operating your plant three shifts a day, seven days a week for the whole year? (Be as specific as possible.)

Concluding remarks

Ideally, each sampled establishment should be visited and interviewed to ensure the reliability of data obtained

in the survey,<sup>8/</sup> especially since the answers to some questions asked are by no means clear-cut. Problems relating to capital utilization as revealed by plant managers could also provide valuable insights on the causes of underutilization, with possibly significant implications for policy-making in particular industries.

The cost of running such interviews however can be prohibitive in a comprehensive survey of Philippine manufacturing industries. Unless adequate funds are forthcoming, it may be advisable to confine the interviews to those industries that are currently of particular interest to policymakers and planners. Since the Annual Survey of Manufactures is also conducted on a mailed questionnaire basis, periodic interviews, say every five years, might be undertaken later on a bigger scale for the purpose of maintaining a high quality of the results of the Annual Survey as well.

The final point should be emphasized that a capital utilization survey of the manufacturing industries is not likely to be very fruitful unless the data obtained from

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<sup>8/</sup> In the utilization survey for 1961 referred to earlier using a mailed questionnaire, 8 per cent of the sample establishments sent in returns of dubious value, mostly accomplished by clerks, secretaries and the like.

the sampled establishments can be supplemented by quantitative information about these establishments as disclosed by the Annual Survey of Manufactures. Only then can one provide an accurate analysis of the determinants of industrial capital utilization and recommend appropriate policy measures to increase the level of utilization in particular industries and/or the entire manufacturing sector.



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