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**CASE STUDIES ON THE PROBLEM OF INDUSTRIAL
EXCESS CAPACITY AND ITS UTILIZATION**

by

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I. Definition of the Problem

Experts specializing in various fields of knowledge assign different meanings to the term "excess capacity". As a result, there is confusion among the economists, businessmen, engineers and statisticians in communicating with each other on the precise nature of the problem. For the purpose of this paper we shall assume two types of capacity. These two types are "technical capacity" and "business capacity".

"Technical capacity" is based on the output ratings of machinery and equipment operating under ideal conditions. It does not recognize such things as slow-downs due to learning periods and underutilization that may take place because of natural calamities such as storms, floods or seasonal patterns that are common to many types of industries. There is a statistical problem in measuring "technical capacity" since changes in operation techniques, quality of raw materials, skill of the workers, incentive systems, and a myriad of other factors could alter a well defined "technical capacity" figure in a short time. A simple illustration may be cited in the blast furnace operations. A blast furnace located near Cincinnati, Ohio, USA, had been assigned a "technical capacity" of 1000 tons of pig iron a day and had operated at this maximum capacity for many years. A change in the raw material feed from 54 % iron bearing ore to 62 % iron bearing pellet increased the output of the plant from 1000 tons to 1200 tons per day.

The problems of measuring "technical capacity" are so numerous that we do not want to get lost in this paper in attempting to study them. Therefore, we put these questions aside and concentrate on the "business capacity". The "business capacity" refers to the "output point" at which the manufacturing activity of a plant would bring the highest financial return in terms of cash profits. The "business capacity" as defined here is a relative concept and its relationship to "technical capacity" is not a fixed one. In other words, the rate of optimum utilization of facilities may differ from one geographic area to another.

For example, a small textile mill in Herat, Afghanistan, receives its maximum profit through a one-shift operation, whereas, a similar plant in Karachi, West Pakistan, obtains its maximum through a two-shift operation.

The underutilization of "business capacity" is one of the major economic problems of developing countries. We shall limit our discussion to selected causes of excess "business capacity". Each reason is illustrated by an actual case study, based on the writer's first-hand personal experience.

Industrial Supplies

The most important cause of underutilization of an industrial facility in a developing country is the limitation resulting from shortages of supplies. The supplies needed are of two types: (1) basic raw materials (2) power, including energy, fuel and spare parts. Both types of supplies are not always available in developing countries in the quantities needed for industrial development.

Several factors contribute to shortages of basic raw materials. Lack of national planning is one of them. Each country must determine at the beginning of its industrial program how much manufacturing output based on local raw materials it can afford to develop. Many times it is assumed that manufacturing processes using home grown raw materials would be easier to accomplish than those that depend on imported supplies. Nothing could be more wrong than this assumption. As a result of the attempts of using local raw materials in many of the developing countries, the plants for the processing of fruits, vegetables and fibres are either idle or are operating at a small percentage of their capacity.

Many of the raw materials available in developing countries are not technically suitable for use in the modern installations to be set up in these lands. This situation comes into existence because of limited knowledge of most businessmen and government planners in technical matters. Any time it is assumed that cotton is cotton and the lack of homogeneity among cottons is not understood. Thus one finds such errors as the construction of a mill designed to use $7/8$ inch cotton in a country where the local material is only $5/8$ inch long. Such was the case of the Rangoon Cotton Textile Mill which was constructed in 1952 with the design done by a most reputable American firm and the machinery supplied by a reliable manufacturer.

In quite a few developing countries successful plant operations using domestic agricultural raw materials had to wait years for the rationalization of the basic products. For example, the sugar industry of Turkey could not be developed until substantial fiscal resources of the State were employed to establish sugar beet growing on a subsidized basis. Even then, the Usak plant could not operate at capacity for years because of a shortage of sugar beets. In a different area of activity, it was not possible to establish in Turkey a textile industry of significant dimensions until Merino sheep were introduced from abroad and Turkish cotton of $5/8$ inch staple length was replaced by longer length Cleveland Acala varieties. It must be kept in mind that Turkey, up to the time of these replacements, was a substantial exporter of both inferior quality cotton and wool. The programs to use these materials at home had all ended in failures and the country imported large quantities of both wool and cotton textiles while shipping its raw materials abroad.

The cases, to be discussed below, are selected from a large group. All of the firms cited for illustration had adequate to good management, sufficient financial resources to operate, and a market large enough to sell all of their production. Machinery in their plants were

of high quality and production slow-downs due to equipment mal-function were negligible. The labour force was well trained and supervised. The only shortcoming was a shortage of raw material.

The first case involves a forge in India located in the Greater Bombay. It was established as a joint venture of Indian and American capital and its production was supervised by persons representing one of the most respected firms in the metal processing business in the United States. The feasibility studies of the project, conducted by very competent people, indicated that the plant should pay for itself in less than three years. In actual operation, however, the plant did not even reach break-even point during this period. The basic problem was one of shortage of the types of steel necessary for the forged products. Some of these steels had to be imported, others could have been supplied from domestic sources. Unfortunately, the quality of the domestic steels that were available to the plant did not meet the specifications and their use resulted in a poor finished product as well as in a high degree of wear and tear on the capital equipment. Foreign exchange shortages of India prevented the importation of steel in the quantities needed. While a part of this plant's facilities remained idle, a large amount of foreign exchange had to be allocated by the State to various industries to import the same type of forgings that could have been produced in India. At present, the firm is operating at a profitable level, thanks to the protection it receives through high customs duties. However, the production is still well below its "business capacity".

The second case involves a raisin cleaning plant in Afghanistan. It is a joint venture of Afghan Government, private Afghan capital and American capital. The plant was designed by the best firm in the United States specializing in food processing equipment. The design was based on tests with Afghan raisins, running for a period of two years. Arrangements were made to sell the cleaned raisins in the Scandinavian countries through the consumer cooperatives. The design capacity of the plant, on a three-shift basis per day, operating about

180 days a year, was 6000 tons of cleaned product. The raisin production of Afghanistan averaged about 35,000 tons a year. Prior to the construction of this plant, raisins were not cleaned, and the foreign market present made it impossible for them to be accepted in the major raisin consuming European countries.

In spite of careful planning, and favourable conditions existing for the establishment of a plant that could bring over a million dollars of foreign exchange into the country, the venture was not a successful one. The problem was the inability of the plant to get enough raisins of the type it could process. Although on paper the potential supply of raw material was very large, this supply was made up of over two dozen major varieties and the plant could process only about one half of them. Furthermore, only five varieties were exportable in a commercial quantity. It became apparent from the very start that the traditional marketing patterns of raisins in Afghanistan would act as a hindrance to the availability of anything like 5,000 tons of raw materials. The raw material situation became tighter when Afghan Government arranged a barter agreement with China. Uncleaned and unsorted raisins were shipped to China in exchange for Chinese goods. The price tag attached to raisins was much higher than the prices in the world markets, therefore, the raisin cleaning plant could not compete for raw materials.

Another plant for processing of Afghan fruits, built in Kandahar in 1950 by the Afghan Government has been a complete failure partly because of the lack of adequate raw materials and partly due to other reasons. While this plant remains idle, tons of fruit of high quality are being wasted because of limited domestic market for fresh fruits.

The third case involves an orange juice plant in Guyana. Guyana is an importer of orange juice in canned form from Trinidad and Jamaica. There are many orange groves in the country. The writer and his team,^{2/}

^{2/} The writer was the head of a United Nations Industrial Team sent to Guyana in 1955.

while driving from the airport to Georgetown on arriving in Guyana, were so much impressed by these orange plantations that they decided to investigate the possibility of processing oranges as one of their first projects. They were surprised to find that such a project was undertaken and had ended in failure. Further investigation did show that there were at least 21 varieties of oranges growing near Georgetown and most of these were not suitable for juice making. Those that were usable were not standard in size and had a large number of seeds. Although the Government distributes every year thousands of orange trees, none of them were of quality to bring about even in the future enough raw material to establish a small orange juice canning or freezing plant.

The fourth case involves a rice-bran oil plant in Thailand. The plant was built by a Sino-Thai firm. The management has high technical and business competence and had pioneered and run successfully the first rice-bran oil plant in Burma. Because of their knowledge of the business, they were able to fabricate a large part of the equipment in Bangkok rather than importing them from Europe, thus saving about 50 percent in capital costs.

Thailand is one of the major rice producing and rice exporting countries in the world. That rice is exported in par-boiled form with the rice bran already separated from the rice. Normally, there is a large supply of rice bran in the country. This bran contains edible oil and if the bran is processed immediately after it is extracted from the rice, the quality of the oil is very good. Thailand is a net importer of fats and oils and there is a ready market for the rice-bran oil in the country.

The plant, after its initial and very successful operation during the rice processing season in 1967, ran into trouble. Its initial success brought into the field three other firms. The raw material supply was not sufficient for the operation of all of the four and as a result all lost money in 1968. At the present time, the four firms have joined forces and the operations will be supervised by the first firm and the excess capacity will be retired.

III. Limited Market

Measurement of the size of the market for a product has always provided challenges to economists and engineers. In the developing countries, the import statistics are usually used in the estimating the volume of future potential sales for a product. Experience has shown repeatedly that import statistics do not always provide an accurate picture. An example may be cited from Guyana. It deals with the consumption of petroleum products. The customs data indicated that the demand for these products had not changed during the period 1953 - 1955. Three feasibility studies, prepared in 1956, using the customs data, reached the identical conclusion that the size of the market was not large enough to justify the construction of a refinery. The Oil Industrial Board, however, noticing a rapid increase in the car registration and the use of fuel oil by a number of large industrial firms, also during 1953 - 1955, doubted the validity of the customs statistics. Since all petroleum products are imported into Guyana by three firms and distributed by them, the confidential data these firms were forced to provide under the Government orders did prove that the consumption of petroleum products is increasing and that the construction of a 20,000 barrel per day refinery is feasible. Such a refinery is in the planning stage at the present time.

There are many reasons for the unreliability of customs data for market forecasting. Even in a country such as Guyana, where the customs data are well organized from the point of tabulation, mistakes are made in the volume figures because of the use of different measuring units and the conversion of these units from one to another takes a great deal of knowledge. For example, the density of crude oil may vary in such a manner that anywhere between 5.5 barrels to 6.0 barrels of crude oil is equal to one metric ton of petroleum.

Customs classifications, as complicated as they are, do not always cover all the products. They are the source of conflict between the government officials and businessmen. In one country, most of the rubber-sole canvass shoes were listed under

miscellaneous textiles rather than shoes and only a count by a team of shoe types worn by people on the streets disclosed the error.

We shall discuss two cases under the market limitations. The first is caused by the misinterpretation of the customs data. This case involves a meat processing plant located next to the La Paz airport in Bolivia. The design of the plant was good and the equipment was of high quality. The plant, although small, was fully integrated. It did butchering of cattle, hogs and sheep, rendering of fats, can meats in tin containers and prepared sausages, hams and bacon. There was an ample cold storage facility, and the work shop had enough equipment to do any type of major repair work. The plant was owned by a family who raised large number of livestock on their plantation type farms. The firm had adequate capital, access to raw material, good labour supply and a management of considerable skill. The lack of a market was its shortcoming and this resulted in undercapacity operation at loss. Eventually, the plant closed its doors.

The feasibility study of this meat processing plant is impressive. One is surprised to find the vast gap between what was planned and what was accomplished. Import data, on which the feasibility study heavily relied, showed a substantial amount of canned and otherwise processed meat imports. In reality, these imports represented hundreds of varieties of specialized products most of which could not have been produced in Bolivia. A detailed market survey would have disclosed this fact. Unfortunately, such studies are expensive and are not employed to any degree in the planning of new enterprises in the developing countries. Of hundreds of projects the writer has seen not a single one had employed an adequate market survey.

Although the above mentioned plant is now closed, it could be placed into operation. The neighbouring countries, Chile and Peru are both importers of sausages and tinned beef. Additional capital and an aggressive marketing programme could prevent complete loss of over a million dollars of funds invested in this plant.

The second case of market limitation is a complex one. It involves a dairy plant owned by the Marketing Board of Guayana and operated by the United Nations. The plant buys raw milk from the farmers, pasteurizes it and distributes the processed milk in bottles to the consumers located in Georgetown, the capital of Guayana. Since the supply of milk is greater than the sales, and because the plant is obligated to buy all the milk offered, millions of gallons are dumped into the river every year. On the other hand, the plant provides only a small percentage of the milk needs of Georgetown and operates at one fourth of its capacity. The imports of milk powder, concentrated milk and condensed milk supply nine-tenths of the milk consumption.

The excess capacity in this particular case could be corrected through the nationalization of all milk and milk products distribution and assigning the Marketing Board of Guyana the sole right to import milk. Any increase in the price of imported milk powder and concentrated milk should tend to encourage the use of better tasting and more nutritious fresh products produced by the dairy plant.

IV. Capital Limitations

Underutilization of facilities in many instances may be traced to inadequate capital availability even though on the surface some other reason may appear to be more significant. Adequate capital, for example, could correct some of the raw material deficiencies through stock piling. Again an aggressive sales campaign is not possible because of the shortages of funds. Export market development also requires substantial credit facilities. Inadequate management may be replaced in part or in total through attracting more capable people by offering them higher salaries. The subject matter is a vast one and its importance is not fully understood by most of the professional economists. The writer, as an economist was among those who were ignorant of the practical aspects of capital needs of business.

During the past ten years however he received a free but disturbing education as a director of a Small Business Investment Company.

The illustration we cite for the capital needs as a deterrent to full utilization involves a quinine plant located in Bolivia. This plant extracts raw quinine from cinchona bark which is gathered during the dry periods in the forests of Bolivia. The bark gathering activity therefore is seasonal and this requires the purchase of about six months' supply of bark in order to operate the plant without interruptions throughout the year. Since the processed product is shipped in batches of 500 kg or more, it takes several months to produce this much and this in turn creates a further demand on the working capital. Injection of a small amount of additional capital would double the output of the plant, increase the foreign exchange intake of Bolivia and change the operations from one of loss to one of profit.

V. Lack of Management

The importance of management as an economic force is well recognized. Nevertheless, one is continuously surprised how quickly good management could correct the malpractices and convert a loss operation to a highly profitable one. Both in developed and developing countries management skill contributes to a fuller utilization of "business capacity".

Our case study in reference to management deals with a Hong Kong textile-garment firm owning three plants. The company produced cloth from purchased yarn and converted this cloth into garments for both men and women. The operations had not been successful and the plant utilization was below the break-even point. Eventually the firm was unable to meet its obligations and the creditors took over. At this point, a new management group came in. They were given a three year

option for the purchase of the assets at 75 % of the book value. The new team was successful in increasing production rapidly and after two years of operation they bought the firm out of profits and in the following two years they managed to double the size of the plants.

In order to increase production to capacity level, and in time exceeding it, the new team emphasized production planning, inventory control, cost accounting, incentives programmes and employee morale. The workers were divided into groups and competition among groups was encouraged to reach higher production targets.

VI. Summary and Recommendations

The reasons for underutilization of production facilities are numerous and in many cases there are several factors joined together. For the purpose of analysis, one can isolate raw material shortages, market limitations, inadequate capital and poor management as being the more important causes. Although there may be not quick and ready made solutions to all excess capacity problems in the short run in many cases, there are possibilities of correcting some of the causes at least in part.

The raw material shortages could be remedied in some instances through imports. If the increased utilization could be set aside for export only, the foreign exchange gains would more than offset the losses due to imports. In order to accomplish an operation of this type the governments must organize a control mechanism. Furthermore, an international "fund" is necessary to provide the necessary foreign exchange to "prime the pump". Such a "fund" could be organized under the direction of the United Nations with all of its members contributing. As foreign exchange loans are made and collected, the "fund" should receive a fee to be used for the purpose of increasing its future financial resources.

This conference and future meetings should investigate the utilization of air transport for shipments of products of developing countries as well as the use of the fast transport for the replacement of broken machinery and carrying of spare parts.

Although our ability to remedy the existing underutilization problems may be limited, the prospects for the prevention of the future excess capacity are bright. In this respect UNIDO could provide valuable help to developing countries.





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