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## Obsolescence

BY L. L. THWING

There is an interesting discussion in the minutes of the hearings before the Couzens committee which has been investigating the income-tax unit. This discussion is between L. C. Manson, counsel for the committee, and A. W. Gregg, then special assistant to the secretary of the treasury. It involves the measure and spread of obsolescence. While it is reasonable to assume that the position of these men is that of a prosecuting attorney and counsel for the defense, respectively, this is not necessarily unfavorable to a thorough airing of the subject. The abstract nature of obsolescence is a topic that may be discussed without serious differences of opinion, but a statement of a specific problem involving the amount and spread of obsolescence is likely to provoke discussion. The case from which I propose to quote is no exception. After such quotations and explanations as seem pertinent it will be possible to select from this material the parts which appear to be most informative.

The case under consideration is that of a taxpayer who purchased an old blast furnace in 1912. This was operated until July, 1920, when it was shut down, abandoned and finally sold as scrap. The taxpayer's claim for obsolescence is cost less depreciation and salvage value. Claim was made and allowed that such loss as obsolescence should be spread over the years 1918, 1919 and half of 1920. Mr. Manson does not attack the amount of the allowance, but only the spread.

Mr. Manson says that the case is exactly parallel with the well known case of the great lakes freighters, in which it was decided by the solicitor that the obsolescence which accrued prior to January 1, 1918, might not be deducted in tax returns for 1918 and subsequent years. (Cumulative bulletin No. 5, page 148.) It was agreed by both Mr. Manson and Mr. Gregg that there

has been no marked advance in blast-furnace improvement since at least as long ago as 1900. Even improvement prior to that time was rather in the increasing size of the furnaces than in any change of methods. Mr. Manson said that obsolescence is intended to cover that loss which is due to the development of the art but not to cover any loss caused by the fact that the owner, for any reason, no longer has any use for the property. "Suppose that we have need for 500 kilowatts of power. We put in a 500-kilowatt generator. Two or three years later we need more power. This 500-kilowatt generator is not obsolete, but the growth of our demand for power is such that if we abandon it and put in a larger generator we will save money. Now while that particular piece of machinery can not be said to be obsolete, it *is* obsolete from the standpoint of the taxpayer. . . . In the case of the blast furnace a 150-ton furnace was not economical for anyone under the conditions. In the case of the 500-kilowatt generator, a 500-kilowatt generator may be more economical for a certain taxpayer's use than a larger generator would be. That depends on his demands. The difference is this: If, regardless of a taxpayer's demands, a piece of equipment becomes obsolete, then this obsolescence is due to changes in the art and not to the taxpayer's situation. This is the case with reference to boats. . . . The development of shipping on the great lakes was such that the man with the 10,000-ton boat could put out of business the fellow with the 5,000-ton boat. The same is true in the production of iron. The man with the 150-ton furnace can not compete with the man who has a 500-ton furnace. . . . My point is that if there is a change made in the art which produces a facility under which more profits can be made than can be made by the use of a then existing facility, the old facility becomes obsolete." Mr. Manson then argues that as 500-ton furnaces were developed about 1895, obsolescence on 150-ton furnaces began at that time. Consequently any allowable obsolescence should be spread proportionately over the years 1895 to 1920. As 1918 was the first year in which obsolescence was officially recognized, only that part which accrued in 1918, 1919 and half of 1920 could be deducted, and that only in the year in which it accrued. This would mean a deduction of 1/25th of the net loss for 1918 and 1919 and 1/50th for 1920.

Senator King, who had just come into the room, then asked: "Take the case of ships. . . . You might say that sailing vessels

## *Obsolescence*

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are obsolete, measured by this standard that you have been applying here?"

MR. MANSON: "Yes."

SENATOR KING: "And yet sailing vessels serve a very useful purpose today. They are operated far more economically per ton carried, in some instances, than are other vessels . . . and yet by the standard that you have accepted, they would be obsolete."

Mr. Gregg agreed absolutely with Mr. Manson's definition of obsolescence, as illustrated by his analogy. He then stated his understanding of the question as follows: ". . . that it is a proper allowance for obsolescence if it becomes apparent at a given time that a given piece of property will, at the end of a specified period, be no longer useful to this particular taxpayer in his business, either because of the changes or the progress of the art, or because the growth or change in his business makes it useless to him." Mr. Manson would not agree with this definition.

It is not necessary to quote further from Mr. Gregg as he has stated his position very clearly in the above sentence. Mr. Manson's position, being indicated principally by analogy and precedent, is not as clear except in the matter of spread. If we neglect the apparent inconsistency in his major contention introduced by his statement "it is obsolete from the standpoint of the taxpayer," his position might be stated as follows:

- (1) That obsolescence is a general condition that affects equally all in the same industry, and that changes in the art and not specific economic conditions should be the measure of obsolescence.
- (2) That the spread of obsolescence is from the time an article first begins to become obsolete until its abandonment, and this apparently without regard to any changes in ownership during that period.
- (3) That any obsolescence which accrued prior to January 1, 1918, can not be deducted after that date.

It is not the purpose of this article directly to support or attack the position of either of these gentlemen, but rather to discuss the points which their presentation has developed. Any differences in their opinions were discussed before the committee and may be read in the report previously cited. The major points at issue seem to be as follows:

- (1) Is the measure of obsolescence technical or economic?
- (2) Is obsolescence fundamentally general or specific?

(3) How is the spread to be determined?

It will probably be granted that the original and most common thought related to obsolescence is improvement in the art. Just what is meant by improvement in the art? From a strictly technical point of view it might be any device that produces a better article or one that may be made from cheaper materials or with less labor. And this is irrespective of the cost of the device, the demand for the improved article or the condition of the labor market. An engineer or a chemist may develop a new mechanical movement or a hitherto unconsidered chemical reaction, which may be hailed by his professional brethren as a notable addition to the science or art. These may be termed strictly technical achievements of pure science, and before they can be made of any practical value to mankind they must be adapted to a specific application and use in some industry. A mechanical improvement must be applicable to some specific art and even then, unless the inventor can show a lower cost per unit, all factors of cost being considered, and unless the sales department can find a market for the improved product, this new device will not cause obsolescence to accrue in all other similar devices because of its technical superiority. Whenever a manufacturer considers the replacement of possibly obsolete machinery his interest focuses on the relative profits which may be made. Will the new machine save money in the old market or make more money in new markets? There can be no reasonable doubt that in practice the test of obsolescence is relative costs or profits. These are economic considerations.

If, however, we concede the truth of this, it does not follow that all economic considerations have equal weight in measuring obsolescence. Mr. Manson states that obsolescence does not "cover any loss due to the fact that the owner decides that he no longer has any use for the property." Mr. Gregg's definition states that a facility becomes obsolete if it is no longer useful to its owner on account of "changes in his business." It is, however, evident that if a manufacturer loses his market his machinery does not become obsolete because he can not sell his product. Gun-barrel boring machinery did not suddenly become obsolete with the close of the war in 1918. Such machinery presumably is now as efficient as any other but there is less market for its product. Nor could this situation have been improved even if better gun-boring machines had been available at the close of the

war. On the other hand the equipment of certain firms producing chemicals during the war did become obsolete at its termination or shortly afterward, because Germany was able to produce these chemicals cheaper than we were at that time.

The answer to the first question is, therefore, that the ultimate measure of obsolescence is economic but it entails only that part of economics which applies to relative costs and profits. The details of the improvements in the arts may be stated in technical terms but the final word will be in dollars and cents.

If this is accepted it follows that obsolescence is specific. That is, every man's economic problems are peculiar to himself. They may not differ substantially from his neighbor's but they are like to differ from those of a competitor in a different geographic situation. Southern cotton mills, for example, as compared with New England mills, enjoy a lower labor rate, longer hours of labor and freedom from labor troubles. Where labor is relatively high, labor-saving devices are at a premium, and, conversely, where labor is cheap new machines must show a greater saving of labor to justify their acquisition. A 1900 model carding machine is therefore more obsolete in New England than it is in the south. It is evident that for a given increase in overhead due to increased investment, etc., the labor cost per unit must be cut down to a certain point before the latter will even balance the former. Labor costs must be cut still further if any improvement in costs is to be shown. It is evident that these factors are specific and peculiar to each factory. This does not mean, however, that the owner of a facility should have the last word on the obsolescence of his own machinery. Many conditions that are entirely foreign to obsolescence affect the balance-sheet. The fact that a particular plant in a prosperous industry is making no money may suggest, but it is no proof of, the existence of obsolescence.

The case of the 500-kilowatt generator is a typical instance of inadequacy and represents a type of obsolescence that does not depend on improvements in the art. It is my belief that inadequacy in size is the only cause of obsolescence under this heading. If a facility is not suitable because of the nature of its production, this is not inadequacy. If the public demand for square clothespins puts round clothespins off the market, machines for making them are not inadequate. Neither are they obsolete. It is a case similar to that of the gun-barrel boring machines previously mentioned.

In the case of the generator, the cost of producing 1,000 kilowatts in two units is too great, compared with the cost as produced with a 1,000-kilowatt unit. If this were not so, the owner could buy another 500-kilowatt unit and the first 500-kilowatt unit would not be inadequate. It will be noted that the determining factor here is the relative cost of production and not any lack of market for the product.

The foregoing discussion is all of a qualitative nature. This is comparatively simple as compared with questions of spread which involve the point at which obsolescence begins, the rate at which it proceeds and the point at which it stops. And these must be put down in definite figures and not in pages of words. The question of the amount of obsolescence is simple, as it involves only cost, depreciation and sale or salvage value. The question of termination is also simple, as it may be assumed that obsolescence ends when the facility is discarded.

On the other hand, the question of spread is a function of so many incommensurable variables that it can not be discussed with any finality. One of the most important questions is the point at which obsolescence begins. Does the conception of the idea that is later developed into an improved machine or does the issue of a patent and the demonstration of the practicability of the idea mark the beginning? Does obsolescence begin when such machines are first put on sale? None of these theories is accurate. It can not be said that these are anything more than increasingly strong suggestions that older machines *may* become obsolete. Today there are many thousands of improvements in the arts that are dormant. They may be suppressed by the owners of the patents to avoid competition with their own machinery. Even after machines are on the market, it is often a decade before they are in general use. This was the case with threshing machines. Just where does obsolescence become more than a trace or a warning? It is when the manufacturer begins to feel the competition of superior machines. Given one hundred separate companies of nearly equal size in the same industry, the purchase and use of such machines by one of them does not diminish the profits of the other ninety-nine. It does disclose profits that they might make, but it has taken nothing away from them. They can continue to pay dividends as before. However, it may be contended with reason that obsolescence begins at this point. If these new facilities are of equal value in all plants this position

is strengthened. But how can we know this? In truth, it is a safe assumption that they will not be of equal value in all plants. Experience only will demonstrate this. The single user of the new machines may know the net cash return attributable to their use but he will not publish this information for the benefit of the other ninety-nine. The greater number of constituents of the industry are in some doubt regarding the value of the new machines to them individually. It seems reasonable, therefore, to assert that even if obsolescence begins at this point, it has not seriously affected anyone, and until a majority of the ninety-nine begins to feel the competition of superior facilities, there is no serious accrual of obsolescence. It is my belief that practically obsolescence begins when the manufacturer begins to suffer loss of profits due to competition with facilities that can produce more cheaply than his own. It begins when his net earnings are reduced by this cause. It does not begin when there is a strong possibility that he might increase them by installing new machinery.

For example there has been on the market for some time an improved textile machine. There is no question that in certain mills it is an improvement. However, it is an expensive unit and in some mills seems to do no more than break even as compared with established methods. The only test of the universality of application of any device is experience, and this is a slow indicator. Consequently the textile industry as a whole is not feeling the competition of this machine. Perhaps it never will. Until there is such assurance it can not be definitely stated that competing machines are obsolete. If a new machine prevails until most mills have discarded their old machines, then, and then only, can we say that the old machines are obsolete. And even then there will be certain localities in which they are not obsolete.

In the case under discussion, Mr. Manson claimed that obsolescence should be spread from the date on which 150-ton blast furnaces first began to be obsolete in 1890. It is not possible within the limits of this article to discuss the phrase "first began to be obsolete" with relation to the progress of the art. It will be assumed that this is the time at which the advantages of larger furnaces were first demonstrated. It can not be denied that Mr. Manson had ample justification in precedent for this stand. However, it is presumably true that it was ten or fifteen years



later than 1890 before the smaller furnaces began to feel the competition of the larger units. If we concede that obsolescence began in 1890, it certainly accumulated very slowly until some considerable part of the country's pig iron was smelted in larger furnaces. It was claimed that obsolescence should be spread uniformly from 1890 to 1920, notwithstanding the fact that the furnace was sold to the taxpayer in 1912. In any case involving the resale of a depreciable asset, the sale price may be presumed to reflect any loss of value due to wear and tear, obsolescence and current cost of a new facility. The purchaser was acquiring a partly obsolete asset and may be presumed to have limited the amount of his offer in accordance with the extent of this. Therefore there would seem to be no justification for a spread greater than from 1912 to 1920. Whatever obsolescence accrued from the time the furnace was built until 1912 would be written off on the books of the original owners. If it is assumed that after 1912 obsolescence was uniform over the life of the furnace, there is no reason why more than  $2\frac{1}{8}$ ths of any demonstrable loss should be deducted in 1918, 1919 and 1920, as obsolescence had no official status until 1918.

Any pertinent discussion of the spread of obsolescence in the instant case is impossible as full details are not to be found in the published report. We do not know the reasons advanced by the taxpayer for a spread over the years 1918, 1919 and 1920. For purposes of discussion it might be assumed that the furnace was purchased in 1912 at a low price. The year 1912 was a boom year. If, except in 1913 and 1914, the furnace averaged an earned dividend of 6 per cent. each year until 1918, it is conceivable that the owner might then have realized that after the war the cost of repairs, renewals and improvements would be such that the furnace could not operate at a profit. Until that time, due to the high war-time price of pig iron, the furnace could operate at a profit even with a heavy maintenance charge. That is, by patching and piecing, the furnace could be kept under blast but it would be evident that the furnace must soon be shut down unless extensive repairs and improvements were made. If the above conditions are assumed and also my definition of the point of inception of obsolescence, the taxpayer's contention will be sustained. If the furnace operated at a normal profit until a certain time, at which it became evident that after a definite date it could not continue to do so, then obsolescence began at the

time when this was realized. In this case it was at the end of the war in 1918. It is therefore logical to declare that the furnace began to be obsolete in 1918. As it was abandoned in 1920, the spread would be from 1918 to 1920. It is believed that under the stated conditions *Regulations 65* contain nothing incompatible with this. This spread would not apparently be permissible under *Regulations 45* or *62*.

Theories work best under ideal conditions. It may be theoretically correct to admit that obsolescence begins when a new machine is shown to be a money saver. But if obsolescence is computed concurrently with depreciation by the straight-line method, it must be assumed that the owner's loss is the same during the first years as it is during the last. This, however, is not likely to be true. The loss at first is so slight that it can not be noticed and during the last years of use it is so great that it compels attention. The phrase "improvements in the art" has no quantitative significance. The administration of any plan, method or theory demands definite quantities. Engineering data in terms of quantities per unit of time are only a part of the story. The entire story will be found on the manufacturer's books if it can be read. It is at least conceivable that an analysis of these books would show what part of loss of earnings is due to obsolete equipment. This would be a measure of the degree or amount of obsolescence. Such an analysis would not be accurate but it could be made more nearly so each year. There is much to be said for any method that admits of refinements and improvements. The arbitrary straight-line method admits of no such improvements within itself. Simplicity is its only virtue.