



**DEVELOPING A METHODOLOGICAL APPROACH TO
THE IDENTIFICATION AND QUANTIFICATION OF
PHYSICAL OBSOLESCE DURING THE INSPECTION
OF PLANT, MACHINERY AND EQUIPMENT**

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Abstract:

One of the crucial factors to be considered during the process of valuation of plant, machinery and equipment (PME) is the depreciation factor. This is due to the fact that most PME have pre-determined economic life and majority of them are already in use. Most PME are subjected to at least three different types of depreciation which will affect the value of each PME. Hence, there is a dire need for the Valuer to be able to identify and quantify depreciation factors which should be done during the inspection of PME. Depreciation of PME could be in the form of physical obsolescence, economic obsolescence or functional (technological) obsolescence. Physical obsolescence (PO) is one of the categories of depreciation that affect PME most, due to wear and tear and exposure to the elements and specifically with regard to the climate of a particular country where PME is located. At present, it seems there is no standard procedure or a methodological approach to identify and quantify PO during the inspection.

This paper concerns the identification and quantification of the PO. The preliminary study done among a group of valuers with different background found that, much guess work take place during the inspection itself. Further study needs to be done to eliminate this problem and perhaps to come up with a methodological approach to enable valuers to identify and quantify PO while carrying out the inspection of PME.

The methodological approach will not only strengthen the basis on the depreciation given on PME but also a standardized format that can be used as part of the valuation process of PME where PO is part of the depreciation that needs to be considered. The approach once developed, will remove the guess work of identifying and quantifying of PO and hence giving the valuation reports added credibility.

Keyword: plant, machinery & equipment, depreciation, physical obsolescence

1. INTRODUCTION

Malaysia, being a newly industrialized country has seen steady increase in the number of plant, machinery and equipment (PME) being imported into the country. This has resulted in an increase in the volume of transactions and also activities pertaining to sales and purchases of PME. In these circumstances, the professionals needed to carry out valuation work and other related assignments, have also increased. In such a case, the demand for valuers with knowledge and skills in the valuation of PME has also increased. However, in many instances, most of the works of PME valuation are being carried out by property valuers who have little or no exposure at all in this field. For the larger international valuation firms, they can afford to bring in experts from overseas or from their affiliate companies to carry out the job. This applies to the government sector as well where PME valuation is being carried out by valuers who have limited work experiences in this field.

A machine is defined as "a device, which is acquired to perform specific predetermined function. It is used singularly or in combination with other items of machinery and equipment to enhance the productivity of an operating activity" (ASA, 1989) while plant is defined as " machinery, apparatus, fixtures etc.. employed in carrying on a business or trade or mechanical or other industrial business...an asset representing capital investment in a manufacturing trade or business" (K. Budhbhatti, 2000)

One of the crucial factors to be considered during the process of valuation of PME is the depreciation. This is due to the fact that most PME have pre-determined economic life and majority of them are already in use. A valuer must be able to identify and quantify depreciation factors during the inspection of PME. Depreciation in PME could be in the form of physical obsolescence, economic obsolescence or functional (technological) obsolescence. Physical obsolescence (PO) is one of the categories of depreciation that affect PME most, due to wear and tear and exposure to the elements, and specifically with regard to the climate of a particular country where the PME is located. At present, there is no standard procedure or a methodological approach to identify and quantify PO during inspection.

Hence, this paper concerns with the existing approach used by valuers to identify which type of depreciation is affecting the PME and how do they identify them. The next question asked is, do they quantify the depreciation at the site and if so, how do they do it? Since this paper is part of a study to come up with a methodological approach to identify and quantify PO in particular, this paper hope to answer if there is a need to come up with such proposal by carrying out a short survey among valuers who are involved in the valuation of PME.

2. THE VALUATION PROCESS

The physical aspect of site inspection and the writing up of PME specifications together with notes on their condition remain as one of the core activity of a PME valuation assignment. Thus formal training and continuing education in this area is very important to enable a valuer to carry out his task diligently and in a professional manner. Although, cases where PME valuer is being sued for professional negligence is very rare, this does not mean that we should become complacent.

The basic valuation process of PME includes:

a. Defining the Problem

- PME to be valued
- Purpose of Valuation
- Intended use of valuation
- Premise of value (installed or removal)
- Effective date of valuation
- Limiting conditions

b. Inspection of PME

c. Collect relevant data

- List, describe and classify assets (inspection)
- Research cost or sales comparables

d. Apply appropriate valuation method

e. Value conclusion

f. Prepare valuation report

The PME valuer while carrying out his assignment will be handling the valuation process of PME which includes the physical inspection of PME and ascertaining the condition they are in and noting the depreciation factors which must be considered when valuing the PME later. Hence, it is very important that the types of depreciation and the quantification of depreciation are correctly noted during the inspection itself.

3. PROBLEM AND ISSUE ON DEPRECIATION

As mentioned earlier, PME are bought to fulfill a predetermined function or need. The value is in direct proportion to its utility. The machinery installed in the best managed and best maintained condition, will still depreciate in time due to wear and tear. Since machines have service or economic life, careful use and good maintenance may extend their useful lives for much longer period. Most of the machinery that required valuation is usually categorized as used machinery. Hence depreciation must have taken place somehow and the valuer needs to identify and also to quantify the depreciation that takes place in each machinery. A study has been carried out among three private valuation firms (two from Malaysia and one from overseas) and a government agency who are actively involved in providing services in the valuation of PME to their clients. The names of the companies or the government agency will not be revealed to respect their wishes. The study concerns the approach taken by the three firms and the agency to identify the type of depreciation and how they quantify depreciation to the machineries in question.

a. Types of Depreciation

- Physical obsolescence

It is the loss in value or usefulness of a property due to the using up or expiration of its useful life caused by wear and tear, deterioration due to exposure to various elements, physical stresses and similar factors. Usually, an experienced Valuer will be able to figure out the physical depreciation by observing the condition of the machine during inspection.

- **Functional obsolescence**

It is the loss in value or usefulness of an item caused by inefficiencies of the item itself, when compared to a more efficient item that new technology has developed.

- **Economic Obsolescence**

It is the loss in value or usefulness of an item caused by factors external to the item such as increased cost of materials, reduced demand for products, governmental regulations, health and safety etc.

For the purpose of this paper, only the depreciation brought on by physical obsolescence will be considered.

b. Depreciation and Maintenance

Equipment installed in the best managed and best maintained plants will still depreciate in time due to wear and tear (physical). Most equipment has economic life which ordinarily last for relatively long periods, while careful use and good maintenance may extend the life much further. Maintenance should be done on a regular basis (scheduled maintenance) and not only after a machine breaks down (ad-hoc maintenance). Proper maintenance will ensure that the economic life of a machine is enhanced while keeping the depreciation lower.

Allico J.(1989) defines depreciation as a loss in value from the new replacement cost. It may be caused by wear and tear, the action of certain elements and obsolescence. Each machine is manufactured with a specific life expectancy. This is often referred to as the machine's economic life. A machine is deemed no longer economic to use when the cost of maintenance exceeds the expected profits generated by it. As machines aged, the economic life becomes shorter.

Factors that influence the economic life of a machine:

- **Maintenance program-** Is it carried out on schedule or on ad-hoc basis?
- **Is maintenance carried out by experts?**
- **Whether spare parts used are genuine or fakes?**
- **Work load-how many shifts a day/ 24-7?**
- **Conditions a machine is exposed to e.g. extreme weather/condition**

- Quality of machinery e.g. German made vs. Taiwan made

All the above factors will influence the depreciation that takes place in a machine. Some of the depreciation is very much contributed by physical obsolescence. Hence, the questions which arise are; how do valuers differentiate the different types of depreciation? Could they identify the physical obsolescence apart from the others? How do they quantify the amount to be depreciated? These are some of the questions put forward to the group of valuers who are involve in PME valuation as a preliminary study to gauge some evidence for the need of further study on a methodological approach to identify and quantify physical obsolescence during the inspection of PME.

4. THE PRELIMINARY STUDY

As mentioned earlier, the preliminary study is carried out to gather some evidence for the need of further study on a methodological approach to identify and quantify physical obsolescence during the inspection of PME. The idea is to come up with some form of standardized approach to ensure that quality of work produced through a systematic and professionally recognized model.

The study was carried out by requiring the valuers from the valuation firms and agency to answer a short questionnaire and also by observing the way inspection work is carried out by the same valuers.

The valuers who are each considered as PME specialists from each company/agency were asked the following questions?

1. The length of time they have been involved in PME valuation.
2. Any formal training that they have undertaken?
3. Do you differentiate the three types of depreciation on site for a particular machine?
4. How do you quantify the depreciation factors?
5. Do you refer to a manual or tables?
6. Would you prefer a systematic approach to identify and quantify the depreciation that has occurred in a particular machine/plant?

The results are tabulated below:

**Preliminary Study on Identifying and Quantifying of Physical Obsolescence
During Inspection of PME**

Valuation Firm	Q1	Q2	Q3	Q4	Q5	Q6
A - Local	7	No	No	Refer to simple reference table (sample given)	Yes	Yes
B - Local	6	No	Sometimes	Refer to simple reference table (sample given)	Yes	Yes
C - Overseas	10	No	No	Experience	No (later in the office)	Yes if there is such method
D - Government agency	5	Yes	Not sure	Observe the condition of PME	No	Yes

5. DISCUSSION

From the short survey, it seems much of the work supposedly done in a professional manner is left to mere guesswork. In a time where valuers (at least those practicing in Malaysia) are required to embrace professionalism while carrying out their assignments and observe work ethics, this study is very timely. The fact that the majority of the valuers had no formal training in PME valuation is very worrying while most of them were unable to differentiate the different types of depreciation leaves a negative impression on them. The fact that all of them would prefer to have a systematic approach to identify and quantify the depreciation that has occurred in a particular machine would mean that a further study in this area would probably be welcomed by PME valuers.

6. CONCLUSION

This is just a preliminary study to gauge the approach used by practicing valuers involved in the valuation of PME as to the method used to identify and quantify depreciation types and quantity. A wider scope of study is needed to really see the advantages (if any) if depreciation can be identify and quantify during inspection of PME itself. A further study is definitely worthwhile doing in the light of much guess work that goes into the work of a professional.

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