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Abstract: In this paper we put in discussion some cases “when it can” or “when it can’t” be used the income approach in plant, machinery and equipment valuation. After a presentation of the particularities of the plant, machinery and equipment valuation we describe the income approach and we present some case studies about when it can or it can’t be use the income approach in this field. To support our conclusions we use some findings of a study that we conducted to identify the particularities of the plant, machinery and equipment valuation activity in Romania.

JEL classification: M49, D46

Key words: plant, machinery and equipment valuation particularities; income approach; case studies

1. INTRODUCTION

Plant, machinery and equipment valuation is a special valuation field due to the particularities of these assets as compared to the other classes of elements subject to valuation.

There are three generally known and accepted approaches to the valuation process, each with its corresponding methods. They are the cost approach, the market approach and, finally, the income approach. All combinations between the three deemed relevant by the valuer as per their professional course of reasoning, experience and knowledge while also compliant with the applicable valuation standards are valid under a valuation report.

Each approach may meet the valuation needs to a greater or lesser extent in a given situation. However, a particular approach or method may not be deemed acceptable in a given situation. Thus, the present article aims to put forward the cases where the income approach or any one of the specific methods may not be acceptable for plant, machinery and equipment valuation purposes. To this end, we deem necessary the identification of the particularities of plant, machinery and equipment valuation, as well as the analysis of the main aspects regarding the income approach and its corresponding methods. Next, we will proceed to the determination of as many plant, machinery and equipment valuation scenarios where the method in question may be used (not necessarily exclusively) or may not be used, respectively, on account of the particularities of the approach being impossible to identify correctly.

2. PARTICULARITIES OF PLANT, MACHINERY AND EQUIPMENT VALUATION

According to the Valuation Methodology Guideline (GME 620) on plant, machinery and equipment valuation, these belong to a class of tangible assets which:

are owned with the purpose of being used for the manufacture or provision of goods or services, rented to third parties or used for administrative purposes;
are likely to be used over several specific time periods.

An asset is assigned to one of the three classes (plant, machinery or equipment) based on a proper understanding of its function and destination and following the professional course of reasoning (Demetrescu, 2014). Therefore, experts in the field place the professional course of reasoning at the very basis of the definition or classification of plant, machinery and equipment. The relevance of following a professional course of reasoning is also emphasized by Ciobanu (2014), according to whom it is very difficult to estimate the value of an asset due to the mix of renowned methods and valuation techniques, experience and professional courses of reasoning and large amounts of available data in one big valuation pot. Therefore, the realistic nature of the determined value is highly dependent on the quality of the “ingredients” used. Normally, according to Comment no. 2 of the Valuation Standard – SEV 220 on plant, machinery and equipment (IVS 220), this type of valuation imposes the consideration of several factors related to the asset subjected to valuation, their environment or their economic potential. Such factors include:

Factors related to the asset:

- the specifications of the asset;
- the remaining physical life expectancy;
- the state of the asset, including its maintenance history;
- the disassembly and moving costs should the asset be valued on a location other than its current one;
- any potential loss of a complementary asset; for example, in the case of machinery, the exploitation period can be shortened depending on the term of the lease agreement associated with the construction site where it is located.

Factors related to the environment:

- the position in relation to the raw material and the product market. Also, the position adjustment can be carried out over a limited amount of time, if the raw material is limited or the demand is transitory, for instance;
- the impact of laws on the environment or other aspects which limit the use of the asset or impose additional functioning or disassembly costs.

Factors related to the economic potential:

- the actual or potential profitability of the asset based on comparisons between the exploitation expenses and the actual or potential benefits;
- the demand for the asset manufactured using plant, machinery and equipment in relation to the micro- and macroeconomic factors which might influence it;
- the possibility that a better use of the asset be determined.

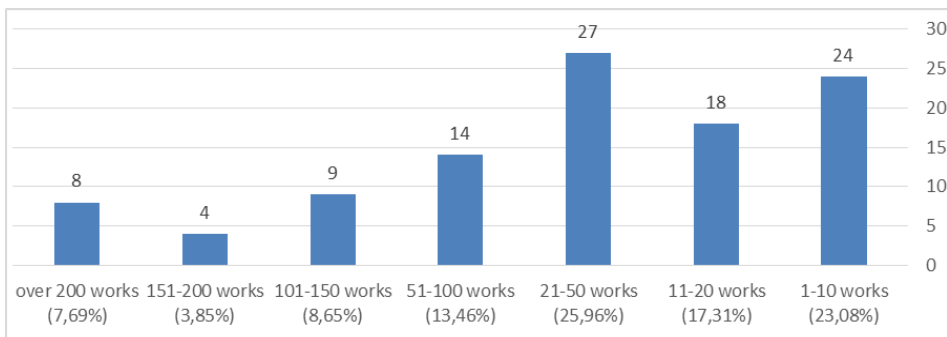
Therefore, plant, machinery and equipment valuation is a rather complex field which, by Demetrescu (2014), constitutes a challenge for valuers as the investigation

starts at a proper understanding of the function and technical specifications of the asset being valued and progresses towards the identification of the manner in which the demand for finite assets may influence that for the plant, machinery and equipment used for their manufacturing.

The complex nature of plant, machinery and equipment valuation projects and valuation projects in general impairs the development of a universally applicable model. Thus, in theory, the valuation standards may be expected to act as a sort of recipe book where one seeking to estimate the value of an asset can find a full list of ingredients, quantities and preparation times. In practice, however, there are numerous aspects that cannot be normalized or standardized such as the selection and processing of relevant data or the valuer's course of reasoning (Ciobanu, 2004).

Demetrescu (2014) emphasizes another important aspect related to plant, machinery and equipment valuation, namely the fact that this particular type of valuation usually involves the examination of the assets (according to the GME 520, examination is compulsory in the event of valuation work being carried out with the purpose of loan guarantees being established as part of the credit granting procedure). This particularity (apart from the cases where examination is compulsory as per the facts stated above) is tightly connected to the relative uniqueness of plant, machinery and equipment, as well as the importance of determining those elements specific to the cost approach in those cases where this approach is either a unique option or a potential one.

This relative uniqueness results in a lack of experience among plant, machinery and equipment valuers. This lack of experience is also revealed by the answers provided by 104 plant, machinery and equipment valuers (out of a total number of 564 potential respondents) within the study conducted in October 2014. The distribution of plant, machinery and equipment valuation projects over the last 3 years is shown in the figure below (**Figure no. 1** The number of plant, machinery and equipment valuation projects over the last 3 years). The figure reveals that most Romanian authorized valuers specialized in plant, machinery and equipment valuation have carried out less than 50 assessments in their field over the last 3 years with 25% of them carrying out less than 10 such assessments over the same period. Moreover, experts in the field (Johnson, 2014) consider that plant, machinery and equipment valuers generally have less experience in using an income approach due to it being used less frequently in this particular valuation field. Even in the event of using the income approach, they rarely capitalize an income stream. According to Johnson, the explanation lies in the relatively short life expectancy of plant, machinery and equipment. At the same time, the same author deems the calculation of discount or capitalization rates specific to plant, machinery and equipment problematic, thus justifying the use of those rates calculated as part of the business valuation process.

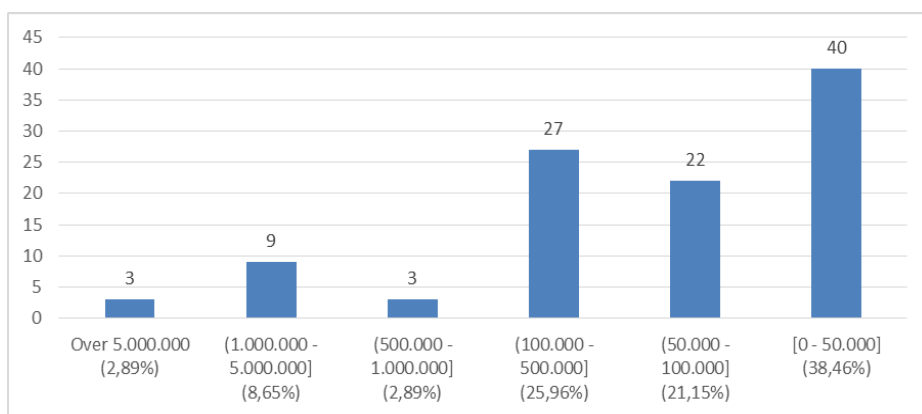


Source: own calculation

Figure no. 1 The number of plant, machinery and equipment valuation projects over the last 3 years

Last but not least, the specialized literature refers to the special education associated with the various classes of valuers as particularity of the field. Thus, Johnson (2014) considers that plant, machinery and equipment valuers base their activity on their technical studies in the field, whereas property valuers base it on their experience in real estate transactions or even auctioning and business valuers base it on their accounting studies. As a personal opinion, the only aspect that bears any relevance on the Romanian market in the absence of any statistical data is whether the authorized valuers specialized in plant, machinery and equipment valuation have any technical studies or not.

The last particularity of plant, machinery and equipment valuation we can identify refers to the relatively low value of the assets. As far as the Romanian market is concerned, this feature is emphasized by the answers provided within the aforementioned study as shown in the figure below (**Figure no. 2** Value (lei) of the last plant, machinery and equipment unit subjected to valuation).



Source: own calculation

Figure no. 2 Value (lei) of the last plant, machinery and equipment unit subjected to valuation

It can be noticed that in most cases the value of the plant, machinery and equipment is below 100,000 lei (approximately 22,000 euros as per the currency exchange rate at the date of the study), only some of them exceeding a value of 1,000,000 lei and 5,000,000 lei respectively.

3. THE INCOME APPROACH

According to paragraph no. 44 of the Valuation Methodology Guideline (GME 620) on plant, machinery and equipment valuation, the income approach consists in the estimation of the value of the plant, machinery and equipment by converting a form of income generated by the asset subjected to valuation to which any of the following situations is applicable (paragraph no. 45) into a value:

- a) the plant, machinery or equipment units subjected to valuation are available for rental;
- b) the separate or combined use of the plant, machinery or equipment units subjected to valuation results in sellable products, thus generating identifiable income. Often times, the generated income is also influenced by a number of intangible assets (processing computer programs, technical documentation, patents, etc.), tangible assets (land, constructions) or circulating assets. Therefore, the estimation of the value of the plant, machinery or equipment will require a distribution of the total value per the contributing assets.

The range of forms of income that can be used to support this approach is unlimited. According to the American Society of Appraisers (2004, 159), the best-known and most frequently used include interests, dividends, the increase of capital value, business synergies or tax economies. Moreover, it is stipulated in paragraph no. 59 of the General Framework section of the Valuation Standard (SEV 100) that the income flow may derive from one or several agreements or may not be associated with an agreement (e.g. the revenue anticipated or generated as a result of either the use or ownership of the asset).

According to Timbuș et al. (2013, 68), the income approach is based on the following principles:

- it is a comparative approach centered on the value of any income-generating property which uses all available data on the income and expenses associated with the property subjected to valuation to estimate its value by converting the income into a value;
- it is an anticipative approach in that the value reflects an investor's or owner's perspective over the future income to be generated over the remaining economic life expectancy or a standard property ownership period (5-10 years);
- it estimates the discounted value of future benefits (the income) resulting from owning a right of possession;
- it is commonly used to value a group of assets or machinery units used in combination with the purpose of generating a sellable product and thus an income flow;
- normally, it is not used to value separate equipment units unless such assets make the object of lease agreements.

According to Sloda (2012), the income approach investigates the amounts investors are willing to pay for an asset with a given income stream in the future. However, in normal conditions, an investor will not pay an amount larger than the current value of the income generated by asset in question. In this sense, Stan (2014a) concludes that the income approach is based on the principle of future income, according to which the market value reflects the desired future benefits to be obtained by a buyer. In fact, this is the fundamental principle of the theory of value based on utility.

Two methods lie at the basis of the income approach:

- a) the income capitalization method, which involves the division of a yearly income to a capitalization rate;
- b) the discounted cash flow method, which involves the discount of the future income to be generated by the asset subjected to valuation over a given period as per a given discount rate.

According to the studies conducted by Lind & Nordlund (2014) and Bellman (quoted by Lind & Nordlund, 2014), in practice, the value estimated using the income approach is the result of several possible combinations between the estimated income, the time period (if any given) and the discount or capitalization rate, depending on the case. Moreover, as Tegarden (2013) also states, in the end it is a rapport or a sum of rappers between two variables, whichever of the two methods is used. Those variables are the income (its form is irrelevant) and the rate (discount rate or capitalization rate, depending on the case). Therefore, the estimated value is basically an equation, possibly with only one unknown variable, which can be determined provided that the other two variables are known. In the case of valuers, the unknown variable must be the estimated value of the asset subjected to valuation. Therefore, the income and the rate must be known. However, the latter can only be calculated based on other similar assets whose market value is known, along with the income in the majority of cases with the (discount or capitalization) rate to be calculated subsequently or the rate in some cases with the income to be calculated subsequently. Next, the two variables (the income and the rate) are to be used to estimate the value of the asset subjected to valuation.

Based on the facts stated above, we subscribe to the opinions formulated by other experts in the field (e.g. Lind & Nordlund, 2014), according to whom the income approach and the sales comparison approach are tightly connected. Moreover, drawing a line between the two may often prove to be a particularly difficult task on account of both the income and the capitalization or discount rate relying on data available on the market. Lind & Nordlund (2014) conclude that it has been argued in the specialized literature that the discounted cash-flow method can stand for a number of different things: a method to calculate the individual investment value, a way to make adjustments to a value derived by a sales comparison approach, an actor-based simulation method, and what seems to be most common in European practice, a version of a direct capitalization approach. In the latter interpretations, the discounted cash flow method should also be classified as a sales comparison approach since the rate of return is calibrated against transaction data. Furthermore, Sloda (2012) states that valuers usually prefer to use the estimated income values determined by other valuers, if possible, and only select the discount or capitalization rate themselves.

Although we share the belief that there is a link between the two approaches, we believe the income approach should not be deemed a method for use within the sales comparison approach, each of the two presenting a large enough number of particularities to be deemed self-standing.

As per the purpose of the present article, we do not aim to provide detailed insight into the determination of capitalization or discount rates, the establishment of types or levels of income or the estimation of the value of any plant, machinery and equipment using the two income approach methods. We deem sufficient the few aspects mentioned, which in fact assist us in providing an answer to the fundamental question raised throughout the present material along with the particularities of plant, machinery and equipment valuation. Indeed, that answer will be provided in the following sections of the paper.

4. WHEN CAN/CAN'T THE INCOME APPROACH BE USED IN PLANT, MACHINERY AND EQUIPMENT VALUATION? (INSTEAD OF CONCLUSIONS)

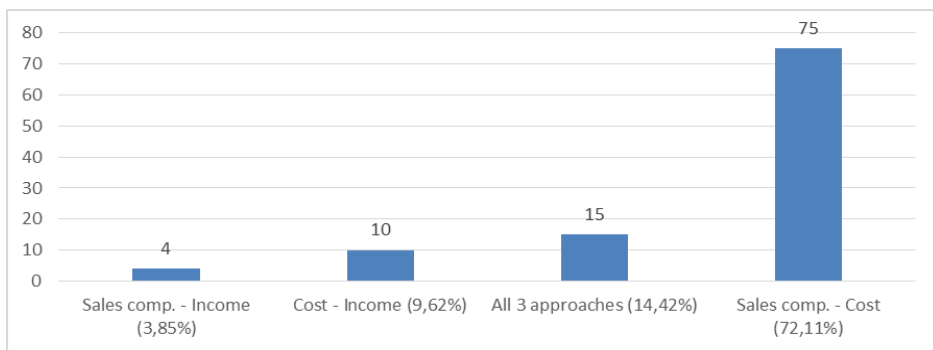
Stan (2014b) formulates the strongest opinion in this sense. In his fifth postulate of a series of six, he states that the income capitalization method is not applicable to plant, machinery and equipment valuation in the sense that it is erroneous to state that their market value can be calculated using this method because of two revealing particularities: i) the relatively short life expectancy of plant, machinery and equipment; ii) the specific income generated by plant, machinery and equipment tends to vary over the remaining useful lifespan of the assets, usually following a descending curve. According to this postulate, there is no plant, machinery and equipment valuation task that can be fulfilled using the income approach method. However, we deem this opinion extreme because there are in fact several situations where the income approach method is indeed applicable, as will be shown in the present material. Moreover, denying any possible ways to determine income and discount rates associated with the field of plant, machinery and equipment valuation would mean accepting the fact that investments in these assets cannot rely on well-founded calculations for the potential investor is bound to make blind payments without receiving any confirmation as to whether they will recover their investment over the useful lifespan of the assets that make the objects of their investment. We believe that we should avoid making such extreme statements, especially in a context where we are bound to be contradicted by the specialized literature and practice in the field.

On the other hand, we cannot support the belief that the income approach is easily applicable in all plant, machinery and equipment valuation contexts. The very first conclusions stated by Daniels (1933) in this sense emphasized the fact that cost is logical and preferable for the valuation of plant and equipment. Today, Johnson (2014) concludes that another explanation for the limited use of the income approach as a plant, machinery and equipment valuation method lies in the fact that, unlike in property or business valuation, there is very little relevant data to rely on since transaction values are generally not revealed. Even the Valuation Methodology Guideline (GME 620) on plant, machinery and equipment valuation that the application of the discounted cash flow method is conditioned by a positive estimated cash flow, otherwise the assets must be valued to be sold. Generally, the income generated by plant, machinery or equipment is a total income generated by several

plant, machinery or equipment units which include the asset subjected to valuation. Thus, as highlighted by Daniels (1933), the task of finding a way to assign a given quota of the income becomes rather challenging. Evidently, there are mathematical calculations that can be performed, but they do not always lead to exact numbers but require approximations and estimations which could eventually cause two or several valuers to operate with significantly different values. Johnson (2014) also emphasizes this idea, recommending the use of the income approach as a method to value plant, machinery and equipment that make the object of lease agreements or with unitary facilities such as chemical plants and refineries. However, it is recommended that the cost approach and market approach also be used with the latter.

The way in which the income approach is used by Romanian authorized valuers is described in the two figures below (based on data collected during the study conducted and mentioned earlier) as follows:

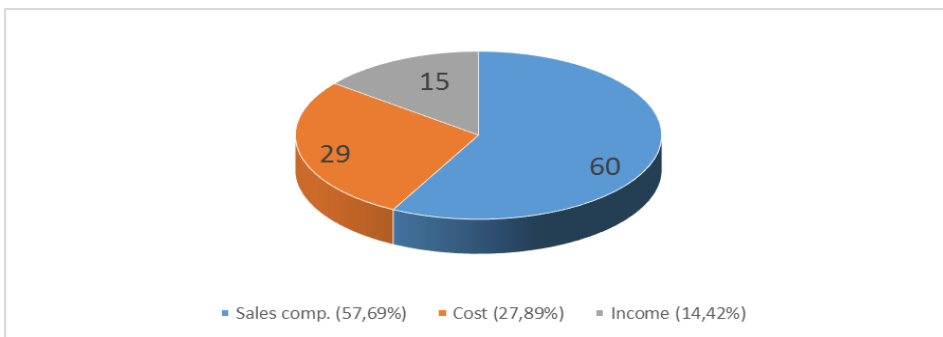
a) the first figure (**Figure no. 3** Approaches used within the latest plant, machinery and equipment valuation project) shows the fact that the income approach was only used to determine the value of the plant, machinery or equipment in 29 cases (out of 104, i.e. 27.89%).



Source: own calculation

Figure no. 3 Approaches used within the latest plant, machinery and equipment valuation project

b) the second figure (**Figure no. 4** The approach used to calculate the final value) shows a very small number of cases where the final value of the assets subjected to valuation was determined using the income approach (15 cases out of 104, i.e. 14.42%).



Source: own calculation

Figure no. 4 The approach used to calculate the final value

Upon putting all these pieces of information together, we can identify at least the following situations where the income approach:

- cannot be used:
 - with unique plant, machinery and equipment – the size of the income and the discount or capitalization rate, depending on the case, are very difficult to determine due to the lack of “comparables” required for the determination of the corresponding values;
 - with plant, machinery and equipment units that do not generate income by themselves, but only when used in combination with other assets – due to the impossibility to determine the income quota corresponding to the asset subjected to valuation based on well-founded calculations;
 - with plant, machinery and equipment with a relatively short economic life expectancy – the identification of appropriate capitalization or discount rates to assist in the calculation of real values to be attributed to the estimated assets is impaired.
- can be used:
 - with plant, machinery or equipment that makes the object of a rental or lease agreement – the income approach is the most suitable for the valuation of this class of assets;
 - with plant, machinery and equipment that generate income which can be individualized, e.g. means of transportation used mainly for the transportation purposes of third parties, in which case the generated income can easily be determined by subtracting the costs from the received amount;
 - with plant, machinery and equipment available in sufficient quantities on the market – their increased availability also draws an increased availability of comparables to allow the calculation of the income and capitalization or discount rates.

Of course, we cannot expect this list to be exhaustive, but additions are to be made based on future studies and research both theoretically and practically.

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