Is the Currently Accepted Valuation Methodology Used By Residential Property Appraisers Fundamentally Flawed Or Can It Be Improved?

By

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"All truth passes through three stages. First it is ridiculed, Second it is violently opposed. Third, it is accepted as being self evident." Arthur Schopenhauer

In a court decision rendered eighteen years ago, an Appellate Court federal judge (Ronald R. Holliger) made the following statement and insightful observation:

"It is difficult to construct a satisfactory definition of intangible property for real estate valuation purposes."[1]

Concurring in that opinion were two other Appellate Court judges (Harold L. Lowenstein, Presiding Judge) and (Thomas H. Newton, Judge).[2]

This statement should have been recognized by a licensed valuation professional such as an appraiser and the members of their established recognized profession as an opportunity to re-examine themselves and the work product which they provide to others who rely upon their services. The statement should have immediately triggered the following normative response and question by an appraiser - - namely, ***should the real estate appraisal industry and my profession re-examine the issue of intangible property for real estate valuation purposes***?

[1] Maryville Properties, L.P. Appellant v. Pat Nelson, Assessor, Nodaway County MO Missouri

[2] Disclaimer: To the author's knowledge, he has no affiliation or connection with any of the three Appellate Judges (including Judge Thomas H. Newton) who presided on this case.

The answer to this question is: "YES- - but, how can we know or determine what that value is?

If an appellate Court judge is struggling with trying to understand the legal issues related to the topic of "intangible property for purposes of real estate valuation", then one would think that the professionals in that industry as well as the governing bodies and organizations[i] involved in that field or a professional in a related field (see Appendix) or an interested party would step in and try to provide their professional expertise, guidance, and input.

Perhaps, someone such as a certified appraiser, tax assessor, tax attorney, real estate investor, real estate attorney, CPA, accountant, valuation analyst, or even an individual property owner, businessman, real estate agent, or a real estate broker has published something to address this concern.

Or, perhaps - - this is not the case. Understandably, the law often deals in abstract ideas. Therefore, in an effort to increase awareness of this issue and to help address this concern, this article seeks to raise a provocative question for debate, contemplation, and discussion.

A non-lawyer multilevel approach is presented to illustrate how this question could be answered. First, a number-theoretic mathematical model is discussed and proposed - - along with a linear algebra argument. Secondly, an ontological argument and thought experiment is presented. Third, a 3-circle Venn-diagram is used to visualize how one can think about the abstract nature of this question. Finally, a legal and a tax argument is made to help attorneys, judges, tax, and finance professionals focus their time and efforts on the underlying law and the financial aspects of a case.

Question:

Is the currently accepted methodology of valuation used by the vast majority (if not all) appraisers for residential property fundamentally flawed or can it be improved upon?

Mathematical Argument

The following mathematical argument is given:

1 + 2 + 3 = 6	**Equation (1)**
2 + 2 + 2 = 6	**Equation (2)**
4 + 1 + 1 = 6	**Equation (3)**

Number theory is one area in the field of mathematics that is quite insightful and useful for laying a foundation to think about the above question. According to number theory, for any given integer ***N***, there exists a finite number of ways to add other numbers (called summand terms) to generate the integer ***N***. The number of restricted and unrestricted partitions of an integer ***N*** is called q(***N***) and p(***N***), respectively - - where q(***N***) is defined as the number of ways to add distinct summand terms together without repetition (1 + 2 + 3 = 6) and p(***N***) is defined as the number of ways to add distinct summand terms together with repetition (1 + 1 + 4 = 6).

For example, given the integer "6" - - there are eleven (11) unrestricted possible ways to add a set of numbers that sum up to the integer 6. Thus, p(6) = 11and q(6) = 4, as seen in the table:

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
6	**5+1**	**1+1+4**	**3 + 1 + 1 + 1**

	4+2	**1+2+3**	**2 + 2 + 1 + 1**
	3+3	**2+2+2**	**2+1 +1 +1 +1**
			1 + 1 + 1 + 1 + 1 + 1

TABLE 1

Source: https://www.integral-domain.org/lwilliams/Applets/discretemath/integerpartitions.php

For the purposes of real estate property, the same number-theoretic approach can also be applied. Every parcel of real estate can be thought of as consisting of at ***least*** three separate, identifiable, components:

a) Land;

b) Tangible property; and

c) Intangible property.

Additional components such as personal property may also be included - - but, will be ignored for the purposes of this article.

From the above table, it is immediately obvious that there are **only** three ways (as shown in "COLUMN 3") - - to add three different summand terms together and generate the integer 6.

Therefore, the value of a parcel of real estate can be thought of as the partition of an integer, ***N***.

Land + Tangible Property + Intangible Property = Value of the Real Property	**Equation (4)**

However, the only time that intangible real property seems to be recognized and addressed for valuation purposes is when it's related to a business enterprise or commercial entity that's being

bought or sold. For some reason, there appears to be no recognition of the existence of any type of intangible property or its valuation related to residential property. ***Why is that?***

Every attorney and non-attorney, certified and non-certified appraiser, real estate investor, banker, mortgage broker, and property owner would agree that there are almost always, only two items listed on a Residential Property Purchase Offer and Sales Agreement - - specifically (a) land and (b) the physical tangible structure (house) located at this physical address. There's also usually a separate price stated for the land and a separate stated price for the structure (house) - - for the purposes of market value assessment and property tax determination.

There is almost never any category listing or item labeled "Intangible Property" shown on a Residential Property Purchase Offer and Sales Agreement. Nor is any valuation or a price for an item labeled "Intangible Property" associated with the subject residential property usually given.

Likewise, on a certified and non-certified Residential Appraisal Report, there is almost never any category listing or item labeled "Intangible Property" - - nor is there usually shown any valuation or price for an "Intangible Property" associated with a given subject residential property on the Residential Property Appraisal Report or expressed as part of the opinion of value.

In other words, the real estate industry, broker, agent, real estate attorney and non-attorney, appraiser, and the average person seemingly only thinks about real estate in the context of two terms (land and physical structure/house) - - and they either completely ignore or fail to consider that there exists an intangible component that must and should also be taken into account in order to arrive at the true value of a given subject residential property.

With the current valuation methodology and approach, one is led to conclude that the physical location of a residential property has **no** economic value whatsoever and is thus worth zero ($0.00) dollars - - which doesn't comport with economic reality.

Or, that the well-know mantra of the real estate industry and profession - - "***location, location, location***", is meaningless and that the public (including the entire profession itself) has been duped all this time by this expression. Recognizing that this creates a huge dilemma, one must therefore consider other ways to address this problem which is inherent in the current valuation methodology and approach used for residential real estate appraisal.

LINEAR ALGEBRA APPROACH

Linear algebra is a branch of mathematics useful for solving simultaneous systems of linear equations that have a finite number of unknown variables.

If there are two unknown variables then there must always be two linear equations in order to solve the problem.

For example - - this is a linear equation: $x + 1 = 3$.

There is a single variable called "x" and a single equation. To solve for the variable x, we know that, if x is equal to 2, then we have found the solution to this linear equation.

Here is another example: There are two variables, called "a" and "b" and there are two different equations.

$$2a + b = 0$$
$$a - b = 1$$

Solving this equation results in a unique (only one) solution: a = **1/3** and b = **-2/3**

If a liner algebra problem has three unknown variables (a, b, c) in one equation - - but only two equations are given, then a solution cannot be determined. For example,

$$3a + 4b + 7c = 16$$
$$5a + 2b = 10$$

However, as stated earlier - - in the context of real estate, there are three variables denoting the land, tangible property, and the intangible property that are needed and therefore a third equation is required in order to solve this system of equations and to determine the value of a property.

NUMBER-THEORETIC APPROACH: REAL ESTATE PROPERTY VALUE

Assume $6.00 (USD) is the cash selling price of a subject residential single-family home

Assume that a state-licensed, MAI-certified residential real estate appraiser has completed his appraisal of a single family residential property and rendered an opinion of value of "6" for the subject property. Assume that the subject property was listed and sold for the same exact price as stated in the appraisal and opinion of value.

In the appraisal report, only two item categories are listed - - "land" and the "physical (tangible) property/house". There is also given and assigned a separate value for each of these items.

The previously described mathematical model can now be applied to this real estate example and discussed in more details. The numbers in each column represent dollar amounts (USD).

The total property value of the subject residential property is "**6**" and this is denoted in the model by "COLUMN 1". However, a given subject residential property has both land and tangible value - - as is represented by different summand terms which are denoted in "COLUMN 2".

Summand Term	Summand Frequency	Relative Frequency	Cumulative Frequency

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
6	**5+1**	**1+1+4**	**3 + 1 + 1 + 1**
	4+2	**1+2+3**	**2 + 2 + 1 + 1**
	3+3	**2+2+2**	**2+1 +1 +1 +1**
			1 + 1 + 1 + 1 + 1 + 1

TABLE 2

There are a total number of "35" summand terms obtained by combining all of the COLUMNS. Using this information and Table 2, a frequency distribution, relative frequency, a cumulative frequency distribution, mean (5.8333) and standard deviation (6.9690) can be computed.

Summand Value	Summand Frequency	Probability	Cumulative Probability
1	19	0.54286	0.54286
2	8	0.22857	0.7714
3	4	0.11429	0.8857
4	2	0.05714	0.9429
5	1	0.02857	0.9714
6	1	0.02857	1.0000

TABLE 3

The relative frequency information in Table 3 can now be depicted as a probability distribution as shown in Table 4.

1	19	0.54286	19
2	8	0.22857	27
3	4	0.11429	31
4	2	0.05714	33
5	1	0.02857	34
6	1	0.02857	35

TABLE 4

Cumulative probability provides a way to measure the odds of one, two, or multiple independent events occurring. The area under a cumulative probability distribution curve can provide useful information such as the probability of obtaining a specific summand term in a partition or the probability of several summand terms occurring in a certain partition. Based on the cumulative probability distribution, Table 1 reveals that the estimated probability of having a partition of the integer 6 with the summand terms of "1", "2", and "3" is equal to 0.8857.

In other words, if the land has a value of "1", the house has a value of "2", and the intangible property has a value of “3”, then there is a 0.8857 probability (or 88.57% chance) of this occurring. Expressed in terms of dollar amounts, if the land has a value of "$1", the house has a value of "$2", and the intangible property has a value of "$3", then there is a cumulative probability of 0.8857 (or an estimated 88.57% chance) that “$6” is the total value of the property

as shown by the probabilities of this number-theoretic model and the fact that the restricted partition of the integer "6" consisting of (1, 2, 3) has an equal likely outcome and occurrence. Now we can consider different scenarios related to this proposed number-theoretic model.

<u>Current:</u> Assume $6.00 (USD) is the property value and cash selling price for the house.

Initially, we shall assume that the subject residential property **<u>only</u>** has tangible property value.

By representing each summand term in **red** text and allocating a specific value for the land and a specific value for the tangible property, then this information can be depicted in "COLUMN 2".

COLUMN 1 (Total Property Value)	COLUMN 2	Subject Property
6	5 + 1	
	4 + 2	
	3 + 3	

Scenario (Current)

The above 2-summand term number-theoretic model best represents the current methodology believed to be used by the vast majority of certified and non-certified residential appraisers.

However, by using this model, the residential appraiser is actually completely ignoring the mantra "***location, location, location***" - - which, by definition, is understood to mean that a given subject residential property has a certain amount of intangible value that is and can be ascribed to it based on its actual physical location. In other words, a 2-summand term model appears to be

flawed because it does not comport with economic reality and fails to consider the location of the physical property.

Scenario #1(A)

Alternatively, we can improve this model by making an adjustment and then allocating its total property value to **both** a "tangible property" (i.e. land and house) component and an "intangible property" component.

By doing so, we can now identify and assign a value to the "intangible property" and this can be denoted by representing its summand term in **black** text - - as shown in the table below:

COLUMN 2	Subject Property
5 + 1	
4 + 2	
3 + 3	

Now, we can state that "COLUMN 2" more accurately represents and takes into account both components which make up the property value of the subject residential property. Therefore, if the "tangible property" value is equal to "5", then the corresponding intangible property value must be equal to "**1**". Likewise, if the "tangible property" value is equal to "4", then the property must have a corresponding intangible property value that is equal to "**2**". Finally, if the property value of the "tangible property" is equal to "3", then the corresponding "intangible property" value must also have the same value and be equal to "**3**".

The acronym "**TRIB**E" helps one to remember "**T**angible – **red**" and "**I**ntangible – **black**" and "E– everything else".

However, there is ***still*** a problem with this assumption because this 2-summand term model representation does **not** take into account the actual physical location, neighborhood, or the part of town where the subject property is located - - even though it has the same property value.

COLUMN 2	Subject Property
5 + 1	Current location
4 + 2	Current location
3 + 3	Current location

Scenario #1(B)

However, if one now adjusts for the actual physical location of the subject property and takes into account the part of town it's located in- - then the model reveals new important information. Using three descriptions (C, B, and A), we can now describe each location (best, current, worst). First, we shall state that if the property is physically located in the **best** part of town, then it is assigned a property symbol of "**C**" - - as shown in **blue** text. And, if the subject property is located in the **worst** part of town or next to a landfill, then it will be assigned a property symbol of "**A**"- - as shown below. We know that our subject property is not in either of these two areas.

Property Location	Part of Town	COLUMN 2
A	Worst location / Next to Landfill	
C	Best desired location / Most Expensive	

By making these two assumptions, this means that our subject property must and can only be assigned to property symbol "**B**" because there is no other possible category available - - as shown below.

Property Location	Part of Town
A	
B	**Current location of subject property**
C	

Next, by assuming that the subject property is physically located in the worst part of the town- - which is known to **not** be the case, we can now randomly assign a valuation for the intangible property associated with the subject property based upon this assumption.

By combining these three tables from Scenario #1A and Scenario #1B we can now depict a more accurate representation of the value of the subject property based upon its tangible property value, its intangible property value, and the actual physical location of the property. In addition, the intangible component of the subject property can now theoretically and simultaneously be represented by **both** its location and its numerical value - - see below (**Scenario #1)**

Property Location	Part of Town	COLUMN 2
A	**Worst location / Next to Landfill**	**5 + 1**
B	**Current location of subject property**	**4 + 2**
C	**Most Expensive Location**	**3 + 3**

(Combined) **Scenario #1**

Finally, based upon the finite number of ways to generate the integer "6" using two summand terms, we can now account for and separately identify the component of the total property value that is contributed by the intangible property ascribed to it based on its specific location in town.

However, this seems to create a slight paradox and appears to be slightly contradictory to common sense.

For example, why would the tangible value "**5**" of the subject property have the highest value if it was located in the worst part of town? Likewise, it makes sense that the subject property would have the highest intangible value "**3**" if it was actually located in the best part of town. But, then why would the tangible value "**4**" of the subject property in its current location be comparatively higher than if it were in the best part of town and given that it's the same identical house?

Analyzing this color-encoded number theoretic model, a property owner and a residential real estate appraiser can now also ask themselves additional questions, such as - -

"What is the probability of obtaining a partition of 6 consisting of (5 + 1)?"

The probability of a obtaining this partition for the integer "6" can be computed using the probabilities from Table (1).

For example, the probability of obtaining a value of "5" is 0.02857 for the tangible component (house) and the probability of obtaining a value of "1" for the tangible component (land) is 0.54286. After multiplying their respective probabilities, the probability of obtaining a (5 + 1) valuation is calculated to be "0.0155".

The probability of obtaining other partitions of integer "6" are also given- - (see Table 5).

Interestingly, the probability of obtaining a value of "4" is 0.05714 for the tangible component (house) and the probability of obtaining a value of "2" for the tangible component (land) is 0.22857 - - that, when multiplied together gives a probability of "0.0131". This is the exact same probability obtained for the partition (3 + 3). The fact that the computed probability for the subject property's current location (4 + 2) is no different than if the subject property was in the best part of town (3 + 3) adds support to the belief that the current traditional 2-summand term model is flawed and can be improved because it fails to account for the property location.

Partition of "6"	Probability of Summand Terms
6	0.02857
5+1	0.01551
4+2	0.01306
3+3	0.01306
1+1+4	0.01684
1+2+3	0.01418
2+2+2	0.01194
3 + 1 + 1 + 1	0.01828
2 + 2 + 1 + 1	0.01540
2+1 +1 +1 +1	0.01985
1 + 1 + 1 + 1 + 1 + 1	0.02559

TABLE 5

In other words, if the subject residential property was in the worst part of town, then would it be logical and reasonable for the value of its tangible property to be worth more (**5** > **4**) compared to its tangible value in its current location? Or, should one expect the probability of the partition (5 + 1) to be higher than the probability of obtaining a probability of (4+2) or (3 + 3)?

Likewise, if the subject residential property was in the best part of town, then would it be logical and reasonable for the value of its tangible property to be equal to the value of its intangible property (**3** = **3**)? Otherwise, there would be no reason or rational basis for the same identical

property to be worth more if the location does not make any difference in the total value of the property compared to the subject property in its current location.

<u>Scenario #2:</u> Assume $6.00 (USD) is the property value and cash selling price for the house.

Alternatively, one can assume that the subject residential property **<u>only</u>** has intangible property value.

Assume that the same size vacant lot is in the worst, current, and best part of town and that there is a developer who will build the same size and type house on each of them. Even though there is no existing physical structure or house on these lots, they each do have intangible value - - simply due to their neighborhood, street location, different lot shape, etc.

Assume that same builder will use the same crew, labor, materials, etc - - the only difference is the actual physical neighborhood where the property is located.

Property Location	Part of Town	Property Lot
A	**Worst location / Next to Landfill**	
B	**Current location of subject property**	
C	**Most Expensive Location**	

Again, we use a 2-summand term number-theoretic model to analyze the problem.

Each summand term is represented in **black** text and a property value is ***<u>randomly</u>*** assigned and allocated to the land based on its neighborhood/physical location and to the "intangible property" - - as shown in the table below:

Property Location	Part of Town	Property Lot (only)
A	**Worst location / Next to Landfill**	**5**
B	**Current location of subject property**	**4**
C	**Most Expensive Location**	**3**

Over time, the vacant lots began to undergo development and acquire additional tangible physical structures, such as utility power pole installation, placement of sewer drains, and poured concrete slab foundations. We can assume that the property value also increases over time based on the increased amount of property taxes levied and assessed as the capital improvements are made.

For discussion sake, we shall assume that the acquisition costs for these new additional tangible assets is equal to $1.00 (utility power pole), $2.00 (sewer drain) and $3.00 (poured concrete slab foundation, including the finished house) as denoted in **black** text - - see below.

Property Lot (only)	Subject Vacant Lot Improvements	Property Lot (only) + (new) Tangible property
5	**Utility pole installed**	**5+1**
4	**Sewer drain installed**	**4+2**
3	**Concrete slab foundation poured + house**	**3+3**

Noting that the summand terms in the "Property Lot (only) + (new) Tangible property" column are the same as the summand terms in COLUMN 2, we can state that "COLUMN 2" again - - more accurately represents and takes into account the tangible components which make up the property value of the subject residential property. Again, if the initial intangible property value for the lot is equal to "**5**", then the corresponding new tangible property value must be equal to "**1**". Likewise, if the initial intangible property" value is equal to "**4**", then the property must

have a corresponding new tangible property value equal to "**2**". Finally, if the property value of the initial intangible property is equal to "**3**", then the corresponding new tangible property value must also have the same value and be equal to "**3**".

Property Location	Part of Town	COLUMN 2
A	**Worst location / Next to Landfill**	**5+1**
B	**Current location of subject property**	**4+2**
C	**Most Expensive Location**	**3+3**

Scenario #2

This model combines each Table from Scenario #2 and takes into account the physical location, neighborhood/part of town where the subject property is located, the lot, the new tangible property assets and is a more accurate representation of the value of the subject property.

Again, based on the finite number of ways to generate the integer "6" using two summand terms, the same probability values, calculations, and results are obtained as with Scenario #1(A and B).

However, again asking ourselves the same earlier questions, we encounter a contradiction:

1. If the subject residential lot was in the worst part of town, then would it be logical and reasonable for the value of its ***intangible*** property "**5**" to be higher compared to its current location or if it was in the best part of town? Absolutely not - - this would not make common sense or comport with economic reality.

2. If the subject residential lot was in the best part of town, then would it be logical and reasonable for the value of its intangible property to be equal to the value of its tangible

property? Possible - - but, again, it ignores the presumed extra premium that is paid for the location that is above and beyond the current location of the subject property.

Logically, if the intangible value of a subject property is based upon "location, location, location" and the actual physical location is in the worst part of town and next to a landfill, then one would expect this property should have the **lowest** intangible value - - not the highest intangible value. Therefore, the 2-summand term number-theoretic model seems to consistently illustrate both a flaw and/or a contradiction in its representation of economic reality.

A three-summand number-theoretic model is now presented.

Scenario #3: **Three-Summand Term Number-Theoretic Model**

Assume $6.00 (USD) is the property value and cash selling price for the house.

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
6	**5+1**	**1+1+4**	**3 + 1 + 1 + 1**
	4+2	**1+2+3**	**2 + 2 + 1 + 1**
	3+3	**2+2+2**	**2+1 +1 +1 +1**
			1 + 1 + 1 + 1 + 1 + 1

In this example, three items categories are listed, named, and a price allocation is made for each item. The categories are "land", "tangible property / house", and "intangible property" - - as shown in COLUMN 3. Each summand term is represented in **black** text (intangible), **red** text (tangible), and a property value is ***randomly*** assigned and allocated to the land based on its neighborhood/physical location - - as shown in the table below:

Property Location	Part of Town	COLUMN 3
A	Worst location / Next to Landfill	1 + 1 + 4
B	Current location of subject property	1 + 2 + 3
C	Most Expensive Location	2 + 2 + 2

We shall assume that a value of $1.00 is assigned and allocated to the land. Over time, as capital improvements are made, tangible property (i.e. sewer, utility pole, house etc) placed, and the neighbor hood becomes highly desirable - - the intangible value of the property will increase.

Given only three different possible ways to add three numbers together to generate the integer "6", we note that one of the ways (2 + 2 +2) implies that the "value of the land is equal to the value of the tangible property which is equal to the value of the intangible property." This may be theoretically possible - - but seems quite unlikely given the above facts and economic reality. And, it would also imply that the combined value of the tangible property is greater than the value of the intangible property - - which would be contradictory to the mantra, "location, location, location" and the Property Location **C** which is indicative of the most expensive location and the best part of town.

Using the information from Table 2 and the probabilities, we can show that:

Property Location	Part of Town	Probability of Summand Terms	COLUMN 3
A	Worst location / Next to Landfill	0.01684	1+1+4
B	Current location of subject property	0.01418	1+2+3
C	Most Expensive Location	0.01194	2+2+2

Scenario 3

If the appraiser were to include a separate line item and value for the intangible attribute of the property due to its physical location, in addition to a value for the land and the physical structure, then we would expect to see information similar to that shown in the above - - see Scenario 3.

In the worst location (**A**), if the land is assigned a value of 1 then either the house or the intangible value due to the location must be assigned a "1" or a "4". Assigning a value of "4"for the intangible value for the location in the worst part of town does not comport with economic reality or common sense - - unless, an aggressive developer plans to tear down the existing house and build a high-rise condo in that location. Alternatively, if a value of "4" was assigned for the tangible property (house), then that doesn't seem to make sense or to comport with economic reality either. Why would a person pay higher price for a house in the worst part of town?

Therefore, since partitions (2 + 2 + 2) and (1 + 1 + 4) have both been shown to not be practical or reflect economic reality, we are left with only partition (1 + 2 + 3) as the best model to use that reflects the value of the land, the value of the tangible property, and the intangible value for the subject property.

The above 3-summand term number-theoretic model suggests that the combined value of the tangible property (land and the house) should make up no more than 77.14% of the cash purchase price of the real estate property. And, the remaining value (11.43%) should be attributed to the intangible property - - such that, the total combined amount should be no more than 88.57 % of the cash purchase price.

LINEAR ALGEBRA

From a linear algebra perspective, the problem with the current methodology and approach used to determining the value of a property is due to the fact that there are three unknowns, but only a single equation available to solve it.

The basic equation is: **x + y + z = Property Value ($)**

where, x = land, y = value of tangible property, and z = value of intangible property

However, as shown earlier, the summand term could each represent one of the coefficients for x, y, and z and this would affect the ultimate solution of a given problem.

Thus, the equation for a parcel of real estate could be: **1x + 2y + 3z = Property Value ($)**

Ontological Argument: LOCATION, LOCATION, Location

The author now puts forth the following ontological argument and thought experiment:

An ontological argument is used by philosophers and students of philosophy to make claims that there exists a "possible world" - - which, is referred to as a counterfactual or a state of affairs that *could* be true. For example, one can make an ontological argument and use it to make the claim that some "**thing**" exists - - such as GOD. One who accepts the idea that some "**thing**" exists in a "possible world" has - - by definition, thus admitted and agreed that the existence of this some "**thing**" is logically *possible*. In other words, if the truth of a proposition is *possible*, then it is

possible in all worlds. Likewise, if a proposition is necessarily true in some possible world, then it is necessarily true in all possible worlds.[3]

In the context of a parcel of real estate, one can now substitute the word "Location" for the word "world" and substitute the word "intangible property" for the word "thing", and use the same line of reasoning as just discussed.

In other words, if a parcel of real estate in one location is believed to have a certain amount of intangible value, then one would expect that the same parcel of real estate, if located elsewhere in the city, would also have a certain amount of intangible value. But, how can a property owner, an investor, or a real estate agent determine what that intangible value is in terms of actual dollar amounts?

If "beauty is in the eye of the beholder", then when it comes to real estate property, there must be a certain amount of "beauty" or intangibility that's invisible, hidden, beneath the surface, or is yet to be realized about the property - - which others cannot (and do not) appreciate in its "as is" condition. In the eyes of an owner, this value must be significant enough that it's worthwhile to own that property - - especially if the owner is a developer who intends to build something on it.

Thought Experiment

Facts:

Assume that you're the owner of a nice residential home located on a one acre lot with an address of 123 Main Street, Chicago, IL. The house was appraised, listed, and can be sold for $350K cash. You paid $50K for the lot years ago and the current annual property taxes are $5K.

[3] "All About Philosophy: Ontological Argument" https://www.allaboutphilosophy.org/ontological-argument.htm (last visited on 5/17/2020 @ 10:26 pm EDT)

First Thought: *Assume that the **same** identical home is actually on a one acre lakefront property or in the most expensive part of town.*

Second Thought: *Now assume that the **same** identical home is in the worst part of town in Chicago.*

Questions:

1. Would your Main Street home sell for more than $350K if it was located on the lakefront or in the most expensive part of town?
2. Would your Main Street home sell for less than $350K if it was in the worst part of town in Chicago?
3. How much of the $350K purchase price represents the tangible value - - the actual physical "bricks and mortar" and how much of the purchase price is for the land?
4. How much of the $350K purchase price represents the intangible value of the property?

The author is fairly certain that if any of these four questions were to be asked of the property owner, their listing agent, broker, real estate agent, a residential certified (or uncertified) appraiser, or any of the other aforementioned professionals in this or a related field such as a tax assessor, tax attorney, real estate investor, real estate attorney, CPA, accountant, or valuation analyst that they would all have different answers - - and that creates a problem.

Specifically, what is the valuation of the intangible property associated with this property?

Surely, the purchase price that one would pay for the same identical house on the lakefront would not be the same as what someone would be willing to pay if it was in the worst part of town or next to a landfill, would it?

The valuation method used by practically every appraiser to establish the value of a residential property appears to be fundamentally flawed and inherently wrong because the appraiser consistently fails to:

(a) consider and acknowledge the existence of the owners' intangible property rights;

(b) take into account the valuation of these intangible property right; and

(c) allocate any amount of the Purchase Price of the property to the owners' intangible property rights associated with their given subject property.

3-Circle Venn Diagram Illustration

The author now presents and proposes the ***330PIE® Intangible Property Valuation Method*** as illustrated by a 3-circle Venn diagram to help understand the abstract nature and the intangible property aspect of a parcel of real estate.

330PIE® Intangible Property Valuation Method

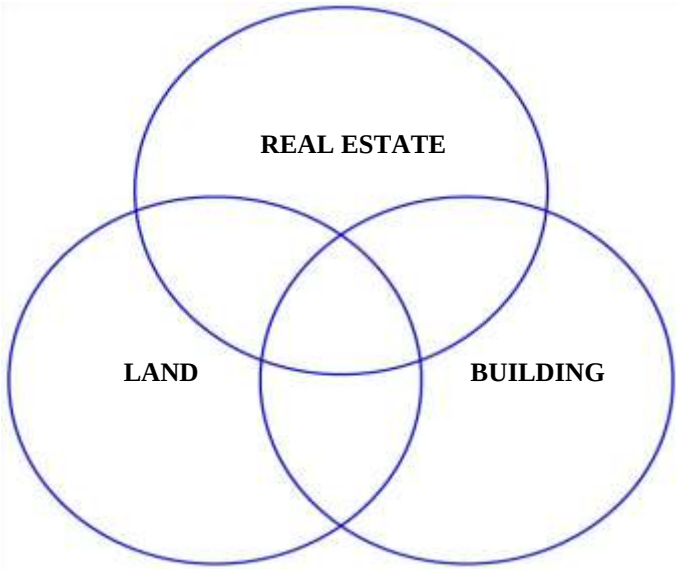

Figure 1

Many residential property owners typically look at a real estate property to buy from a given perspective such as depicted in Figure 1 - - and they often consider other "intangible factors" about the property such as the size of the house, the age of the house, its proximity to a school or their job, or its asking price. The neighborhood or the physical location of the property are known factors that are considered by a prospective property owner.

However, residential property owners can also view a property from the perspective of it consisting of (a) non-depreciable and (b) depreciable property - - as shown in Figure 2.

330PIE® Intangible Property Valuation Method

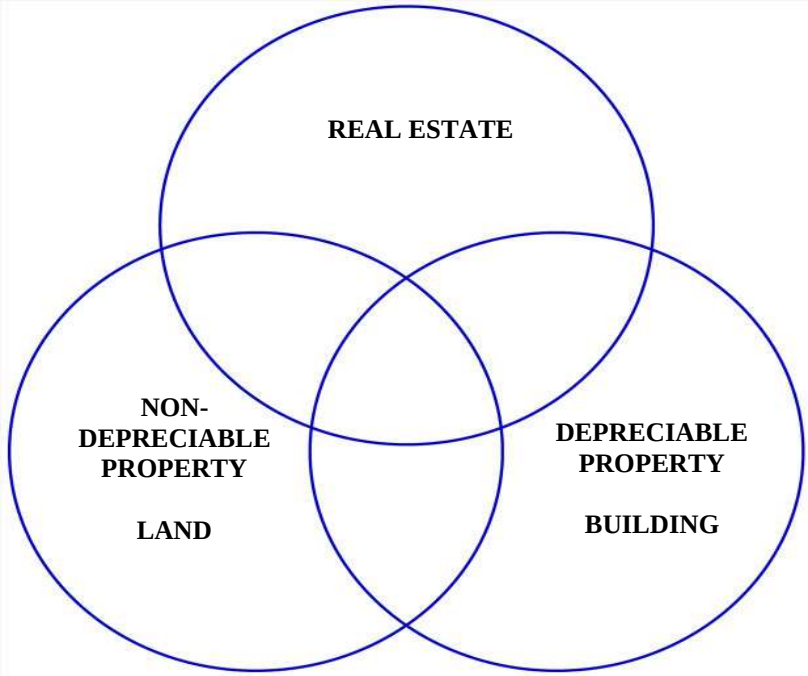

Figure 2

If this approach is taken, then a property owner should and therefore - - could also consider looking at the property from the perspective of the tax benefits that the property offers, such as the amount of annual depreciation (tangible property) and amortization (intangible property) deductions that it offers, as seen in Figure 3.

Neither of the two perspectives depicted in Figure 2 or 3 is believed to be routinely used or considered by the vast majority of current or prospective residential property owners. Nor is this aspect of a real estate purchase and sell believed to be usually discussed by a real estate agent, real estate broker, or a realtor with their prospective buyer and the seller.

It's also a subject which is not usually addressed or mentioned by a certified (or non-certified) residential property appraiser in their appraisal report. **Why not?**

330PIE® Intangible Property Valuation Method

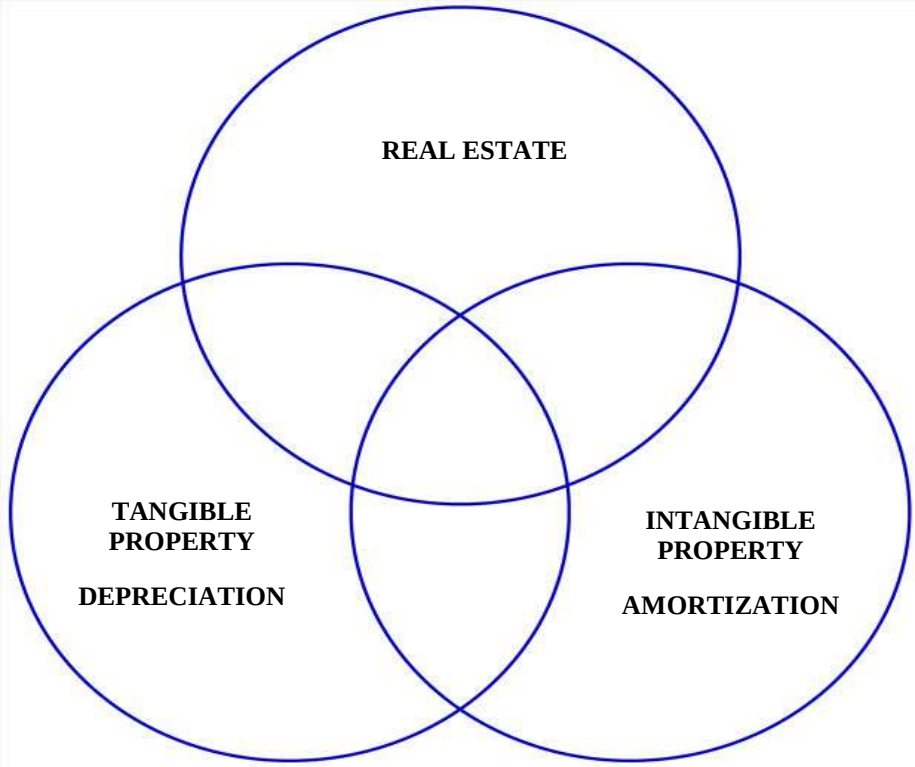

Figure 3

Property appraisers are well aware of intangibles and often mention them in their appraisal report concerning a business enterprise or commercial entity.

If a current or prospective residential property owner were to adopt these two new perspectives, then they would be able to claim and obtain some very attractive and unique advantages from a tax point of view - - especially if they have or were to start a home-based business.

LEGAL ARGUMENT

Existence of the Intangible:

To prove the existence of an intangible property associated with a given subject property, the author claims the "Purchase Offer and Sales Agreement" of the subject property provides the evidence needed to establish this fact.

Under the section "Restrictions, Liens, Covenants, and Encumbrances", several different types and examples of intangible property can be found and identified - - such as, a right of way easement, a utility easement, a conservation easement, etc. The presence or absence of a certain easement, its type (appurtenant or gross), its duration, and its purpose can potentially all affect what a willing buyer and a willing seller would accept and pay for a property. These intangible factors do affect the value of real estate and therefore should be considered in the valuation.

As noted in Maryville Properties, appraisers may believe that there must exist some type of standard test for intangibility which can be relied upon for valuation purposes.

In that situation, the test which the assessor argued to be used to establish intangibly consisted of four determining factors: (1) the intangible asset must be identifiable, i.e. legally recognized; (2) it must be capable of private ownership; (3) it must be marketable, i.e. capable of being financed and/or sold separate and apart from the tangible property; and (4) practically, it must possess value, i.e. have the potential to earn income, or its existence is of no consequence.

TAX ARGUMENT

Assume that the owner of a national hotel chain spends three (3) days/nights on-site at each of his fifty hotel properties checking on their operations. He also spends three (3) days/nights working on behalf of his business at his personal residential home-based office each year. Other than taking 4 weeks of vacation on a cruise, he spends the rest of his time at an office downtown which his company leases. The business owns tangible and intangible property assets that it uses and claims depreciation and amortization deductions on its federal tax returns.

In contrast, assume that a residential property owner with a home-based business spends three (3) days/nights working on behalf of his business at his personal residential home-based office each year. The rest of the year, he spends working part-time at a local factory. The property owner also owns tangible and intangible property assets that he uses and claims depreciation and amortization deductions on his federal tax returns.

Under the Equal Protection Clause, owners of similarly situated property are entitled to roughly equal tax treatment. The hotel chain owner and the home-based business property owner would expect to receive equal tax treatment under the Equal Protection Clause.

For amortization and tax purposes, the author claims that the acquisition costs of real estate property is equal to the sum of the acquisition costs of its tangible property and the acquisition

costs of its intangible property. This implies that a residential property owner with a home-based business should be entitled to claim an amortization deduction for their intangible property assets which they personally use and which their business uses related to their residential property.

Acquisition Costs of Tangible Property	**+**	**Acquisition Costs of Intangible Property**	**=**	**Purchase Price of Property**	Equation (5)

The tangible property, land, and any personal property items such as appliances are often listed on the Purchase Offer and Sales Agreement. The price or amount that is paid for the land, the physical building (residence), and personal property is also usually disclosed on the Purchase Offer and Sales Agreement or can be obtained from other easily accessible supporting documents, such as the property tax records and sales receipts.

However, any intangible property that may be noted and stated under the "Restrictions, Liens, Covenants, and Encumbrances" section is usually not specifically itemized or listed as a line-item category in the Purchase Offer and Sales Agreement. Nor, is a specific price or amount that is paid for the intangible property typically given or stated as a separate line-item category in the Purchase Offer and Sales Agreement.

Tangible (Tax Benefits) + Intangible (Tax Benefits) = Value of the Property	**Equation (6)**
Land + Depreciable Property + Amortizable Property = Value of the Property	**Equation (7)**

Figure 4 depicts a new perspective that a current and prospective residential property owner with a home-based business should consider adopting. It assumes that a residential property owner

knows and understands the underlying tax benefits related to tangible and intangible property and summarizes Figures 2 and 3.

Once this new perspective is adopted, then the important idea and concept regarding the acquisition price of an intangible property and the acquisition and valuation of an entire bundle of intangible property assets can be addressed.

For valuation purposes, the author claims that the value of real estate property is equal to the sum of its tangible property value and its intangible property value.

330PIE® Intangible Property Valuation Method

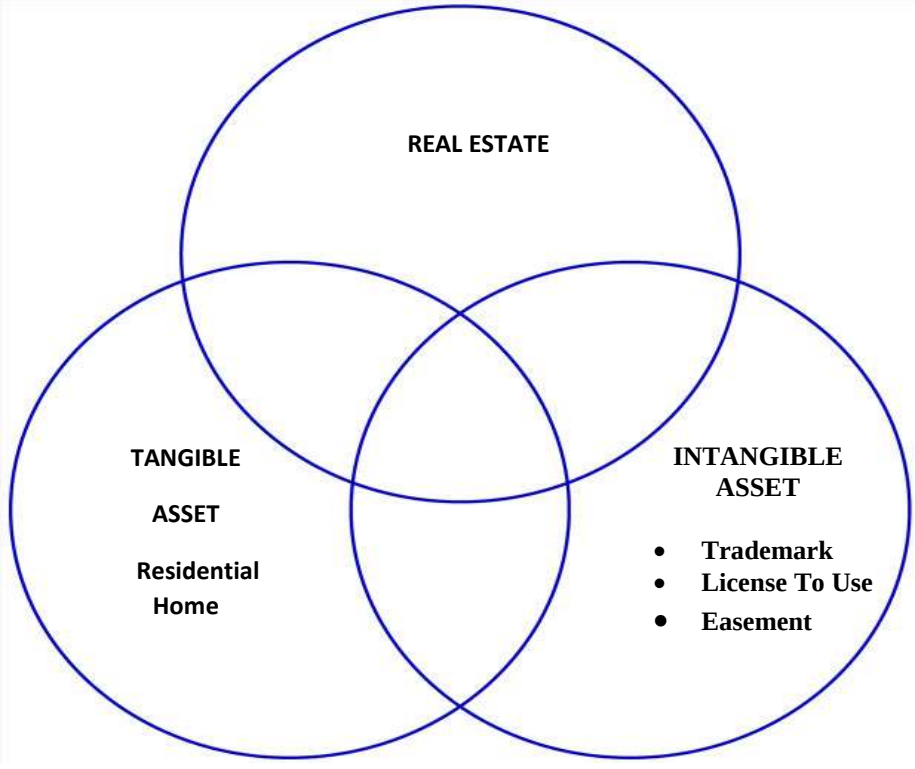

Figure 4

Price of the Intangible:

According to one presenter who discussed the topic "Understanding Intangibles Assets and Real Estate" at the National Conference of State Tax Judges at its 36th Annual Meeting (SEP 2016, Portland OR) - - the following statement was made (Slide #9 of 73):

"There are typically two circumstances in which assessors encounter intangible value:

1. A property sells and intangible assets are included in the price, along with real and personal property.
2. Income from a business is used to value the real estate in an income approach, such as hotels and nursing homes.

These two circumstances may apply to a business or commercial entity; however, the listing and categorization of an intangible asset related to residential property does not appear to be routinely stated, listed, or disclosed by either certified or non-certified residential appraisers in their appraisal report. Likewise, there is no allocation of the purchase price of the residential property disclosed, listed, or shown in their appraisal report.

Under the 2016-2017 Edition of the Uniform Standards of Professional Appraisal Practice (USPAP) FAQ 173, the following Question and Answer was provided

Question: There are occasions when the client does not specifically request separate valuations of non-real property assets, even though they may be present. Is the appraiser still required to value those assets separately?

Answer: No. This is a scope of work decision to be made by the appraiser; Standards Rule 1-4(g) does not require separate appraisals of these different types of assets.

This may be an acceptable standard of practice for a commercial entity or business - - because it is a "scope of work decision" and the Standards Rule 1-4(g) does not require separate appraisals of different types of [intangible] assets; however, a residential property owner ***should request*** that a separate appraisal be provide to them by an appraiser.

In addition, "most states do not have laws that directly address the treatment of intangibles for property tax purposes."

As such, "until now there has been no accepted guidelines for valuing intangibles for property tax assessment purposes" - - in contrast to financial reporting, tax reporting, and business appraising which do have such guidelines.

Apparently, real estate appraisers and assessors do not think that it is "always necessary to value intangible assets to determine real property value". They also believe that an "estimate of the real property value can be done that is independent of the intangible assets".

There are three well-known methods used to estimate or allocate intangible assets:

- Cost Approach
- Market Approach
- Income Capitalization Approach

They each have their advantages and disadvantages.

For example, for fee simple real property value estimates, the cost approach has been found to be effective. The cost approach is also easily applied by both appraises and assessors since they have ready access to the cost data and land sales records that are needed in order to make their determinations. However, the disadvantage of the cost approach is its failure to allow making measurement adjustments for depreciation and obsolescence of the asset.

In contrast, it is said that the "Market [approach] is the best source for determining if intangible value was included in a real property transaction" because the transactions can be verified and "if the sale price reflects going concern", then it can be used to "verify how much of the price was allocated to the intangible assets." (Slide #36)

Another advantage of using the Market Approach is seen whenever a business is purchased because there is a requirement that an Asset Acquisition Statement (IRS Form 8594) must be completed and submitted to the IRS as well as disclosure made in the Company annual reports and certain filings (8K, 10K, etc.) with the SEC. (Slide #38)

These documents can then be obtained and reviewed since they may list the intangibles as a separate line item. However, the amount of the purchase price allocated to the acquisition of the intangible assets versus the amount allocated to real property is not usually known to the market participants (buyers and sellers). In addition, if the annual reports do provide any disclosures of the allocation of the acquisition price for the intangibles, then it is usually for either tax or financial accounting purposes and not reflective of the real property market value.

Finally, under the income approach, there is often no inclusion of the intangibles when the space rental income is used to estimate the gross income of a property. When the gross income is based upon business income, intangibles may be present - - however, the amount must be subtracted from all business-related expenses in order to obtain an accurate estimate of the income derived solely from the real property. This approach is referred to as the Management Fee Method (Rushmore Approach) and used often with lodging facilities that are being evaluated. However, its disadvantage is due to the fact that any management and franchise fee is treated as a (capitalized) expense and/or included in the operating expenses - - which tends to reduce the ability to fully capture all of the intangible value.

Valuation of Real Estate Property

According to Jean Folger, a financial writer with over "fifteen years of experience covering real estate, investing active trading, and retirement planning" - - 'technically speaking, a property's value is defined as the present worth of future benefits from the ownership of the property'."[4]

[4] "What You Should Know About Real Estate Valuation", Investopedia, 3 March 2020) - - https://www.investopedia.com/articles/realestate/12/real-estate-valuation.asp last visited 5/21/2020.

Folger says that "real estate valuation is useful for determining the asking or purchase price of a piece of real property".

Deakin University produced and published a short video and transcript on the Futurelearn.com website, entitled "Cost, Price. Value – what is the difference"[5] and provides a clear understanding about these related topics.

The valuation of a single residential property is very important and often performed by a state-licensed residential or commercial real estate appraiser. Most often, this professional relies upon and uses one of three basic approaches to determine the fair valuation of a property. The three well-known appraisal methods currently used in the industry as per Rule 1–4 of the Uniform Standards of Professional Appraisal Practice ("USPAP") are:

- Sales comparison approach
- Cost approach
- Income capitalization approach

They each have their advantages and disadvantages.

For example, the sales comparison approach is predicated upon prices actually paid in open market transactions for comparable properties. The sales comparison approach assumes that an informed purchaser would pay no more for a property than the cost of producing a substitute property with the same utility. The cost approach assumes that the cost of the property should be based on what it would cost to build a similar property- - including the value for the land and

[5] "Cost, Price, Value - - what is the difference", Deakin University, - - https://www.futurelearn.com/courses/property-value/0/steps/33660 (last visited 5/21/2020)

value for the improvements (less depreciation costs of the improvements). Finally, the income capitalization approach involves discounting to present value the anticipated net income that the property is expected to generate over its usable life. The income capitalization approach assumes than an investor would pay no more than the present value of the anticipated net income of the property.

With regards to real estate valuation, a buyer, seller, appellate court and/or district judge can examine and review the records of the local tax assessor, evaluate an appraisal of a residential or commercial real property and its opinion of value rendered by a (certified or non-certified) licensed real estate appraiser, and/or they can review a brokers opinion letter for a given real property.

However, all of these documents are limited when there is a need to account for and to establish an objective basis for the purpose of identifying, determining, and establishing an acquisition price and for the intangible property associated with residential real property ***based on its location***. Likewise, given the physical location of a commercial property, the same argument can be made when it come to identifying, determining, and establishing an acquisition price for the intangible property value associated with a commercial property based on its physical location as well.

Valuation of the Intangible:

Under the current methodology, the author claims that an appraiser does not typically:

- recognize the existence of the intangible value associated with a given residential property;

- acknowledge the existence of the intangible value associated with the residential property as evidenced by failing to list it as a distinct category or item on their issued Appraisal report;
- allocate any price to the intangible value associated with the residential property; or
- use or have any means of determining the intangible value associated with the residential property based upon its actual physical location.

DISCUSSION

One can argue that there exists a number-theoretic based method for identifying the three main components associated with real property - - land, tangible property, and the intangible property. These three components are selected because they are believed to carry the most weight when an informed buyer and seller must negotiate and determine a fair, reasonable "asking or purchase price" for the real property. One can then use the purchase price of the real property to establish and to allocate an acquisition cost for each of these respective components. Accordingly, there are well-known supporting documents that already exists - - such as, the "Purchase Offer and Sales Agreement" and the property tax land records, and they can be used to help an appellate judge or a district court judge determine both the acquisition costs of the land and the acquisition costs of the physical (tangible) structure.

These same documents can also be used to specifically itemize and define the intangible property related to the real estate property as well as provide the total acquisition costs of a specific intangible property for real estate valuation and tax purposes. With this information, any party of record and their attorneys involved in a legal dispute can now make a showing which a

district court or an appellate court judge can then make a decision - - based on solid, objective, reliable evidence in the record and which can be supported and identified by all affected parties.

Combining the above mathematical, ontological, logical, legal, tax arguments and the thought experiment together, the author claims and concludes that the currently accepted methodology of valuation used by the vast majority (if not all) appraisers for residential property is thus lacking, fundamentally flawed, and could be improved upon.

As such, the author further claims and concludes that the final opinion of value rendered by an appraiser and the dollar amount that is stated in their appraisal report (and used by others) in reliance upon their current methodology is seemingly - - inaccurate (at best) and can also be improved upon. Although the number-theoretic model used a value of “6”, the analysis and results could be applied to a parcel of real estate that was valued at $6 - - the same logic and reasoning would apply if it was valued at $60K, $600K, $6 Million, or even $60 Million dollars.

Licensed professionals in an established recognized profession would seemingly be willing to accept or to reject these arguments raised and therefore seize this as an opportunity to consider ways to improve their level of professional services and what they offer to those who depend upon them.

One can now understand why the words of the appellate federal judge seem to be an expression of exasperation because- - if the opinion of value rendered by an appraiser of residential property cannot be relied upon because it does not "comport with economic reality" and/or it fails to

address the arguments raised in this paper, then is the opinion of value misleading at best or incorrect, at worst? What then, should an appellate court judge do?

The following application of the ***330PIE®*** ***Intangible Property Valuation Method*** is now given to demonstrate how to calculate the intangible value of a residential real estate property.

Using our three-summand term number theoretic model and our earlier example of the $350K home purchase (including the $50K paid for the lot), we shall assume that the property could be sold for the following amount of cash (shown below) - - taking into account its theoretical and actual physical location:

TOWN		
Worst Location	**Current Location**	**Most Expensive Location**
$250K	**$350K**	**$450K**

Price of the One Acre land: $50K

Assume that the same builder built the same house with labor, material costs, and the same lot size at each site.

After removing the $50K price for the land, the remaining amount ($300K) of the purchase price is then allocated to the value of its tangible property and the intangible property.

Allocate 50% of $300K for the tangible property: $150K

Allocate 50% of $300K for the intangible property: $150K

Since the house could sell for a cash price between $250K and $450K, then its intangible value at **any** of the three locations would be expected to be the difference between $450K and $250K.

In other words, the intangible value of the same identical house at its current actual physical location should be a positive, non-zero value between: $0K and $200K.

It is possible that the exact same house and lot size at each of these different locations has the same intangible value of $0 - - but, this would not comport with economic reality.

However, we can assume that it is more likely that the intangible value of the house located in the worst part of town is less than the intangible value of the exact same house and lot size were it to be located in the most expensive part of town.

330PIE® Intangible Property Valuation Method

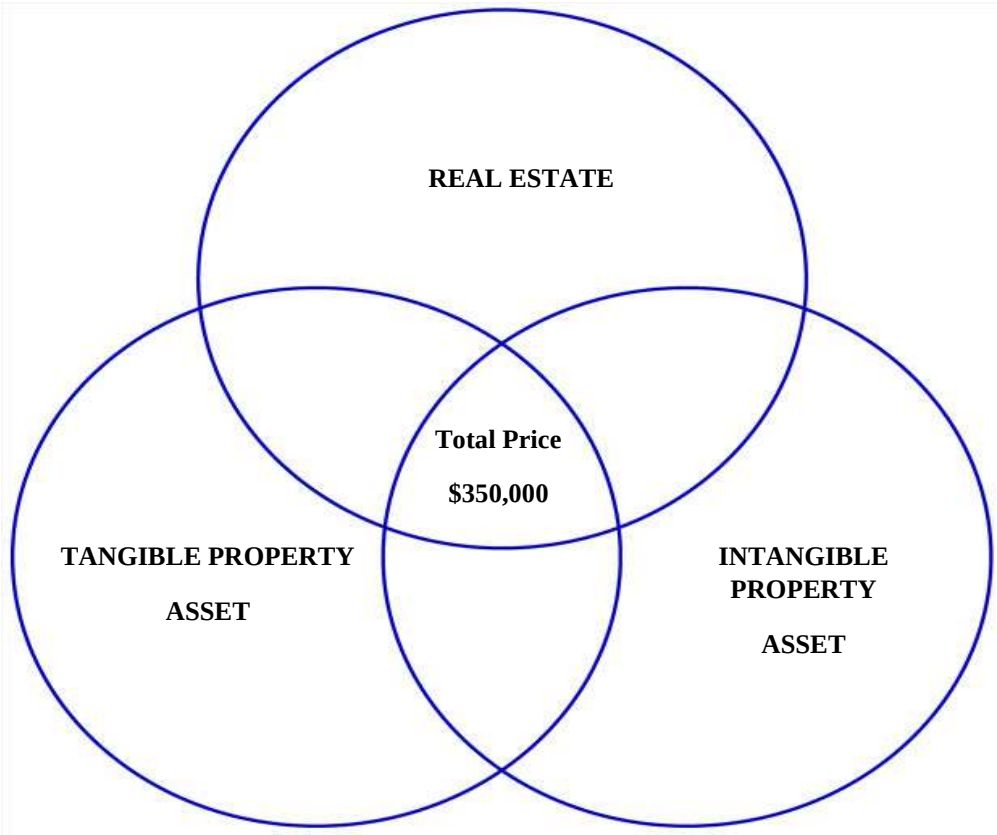

Figure 5

Using our number-theoretic model and COLUMN 3 which denotes the property in the worst location, each summand term in the partition (1 + 1 +4) is now used to denote either the price of the land, the price of the tangible property, or the price of the intangible property.

Property Location	Part of Town	COLUMN 3
A	Worst location / Next to Landfill	1 + 1 + 4
B	Current location of subject property	1 + 2 + 3
C	Most Expensive Location	2 + 2 + 2

Since the lot price is given as $50K, then this fact can be represented by the lowest summand term “1” - - as shown in the first row. This implies that the tangible property (house) must have a value of either $50K or 4x as much - - or $200K. Thus, if the house is assumed to have a value of $50K, then this implies that the intangible value of the property is $200K - - but, this would not comport with economic reality, since the most expensive location should, in theory, have the highest intangible value. Alternatively, it could be assumed that the house has a value of$200K and the intangible value of the property is $50K. However, when compared with the other options, this would imply that the most expensive house is located in the worst part of town - - which, again, does not comport with economic reality.

Likewise, each summand term in the partition (2 + 2 +2) could again denote either the price of the land, the price of the tangible property, or the price of the intangible property, as shown in row 3. However, this would imply that the value of the land is the same as the value of the house and the value of the intangible property. In other words, the price of the land would have to be $100K - - which, again does not comport with economic reality or the stated facts. In addition, it would imply that the value of the intangible property based upon its location in the best part of town is in less than its value in the worst part of town - - which, does not comport with economic reality.

The last and only possible partition (**1 + 2** + **3**) shown in COLUMN 3 for the integer “6” - - is the only one, in theory, that could simultaneously satisfy the fact pattern as well as incorporate the economic reality. Thus, if $50K is assigned to the land, then the house would have to have a value of - - ***at least***, either $100K or $150K. If the house is valued at $100K, then the intangible

property must have a value of $200K in order for everything to add up to the purchase price of $350K. Likewise, if the house is valued at $150K, then the intangible property must have a value of $150K in order for everything to add up to the purchase price of $350K. As shown below in the first two rows, given a lot price of $50K, an exact amount of $100K or $150Kfor either the value of the tangible or the intangible property only adds up to a total of $300K - - which does not satisfy the fact pattern.

Therefore, one has to conclude that the "missing" $50K must be added to the value of either the tangible property or the intangible property. As shown in the last two rows, if the value of the tangible property is equal to $150K, then the value of the intangible property must be equal to $150K in order for the total sum to be equal to $350K. And, if the value of the tangible property is less than $150K, then the value of the intangible property must be higher than $150K - - and could be as much as $200K in order for the total sum to be equal to $350K.

TOWN (Current Location) = $350K cash			**Total Price**	**COLUMN 2**
Land	**Tangible Property**	**Intangible Property**	**Land + Tangible + Intangible**	
$50K	$100K	$150K	**$50K + $100K + $150K = $300K**	**1 + 2 + 3**
$50K	$150K	$100K	**$50K + $150K + $100K = $300K**	**1 + 3 + 2**
$50K	**$150K**	**$150K**	**$50K + $150K + $150K = $350K**	**1 + 2 + 3**
$50K	$100K	$200K	**$50K + $100K + $150K = $300K**	**1 + 2 + 3**

If the last row ($50K + $100K + $200K) is assumed to denote the property located the best part of town, then this ratio (1:2:4) respectively representing the land, house, and location would seem to comport with economic reality.

In conclusion, from the above analysis, one can confidently state that given the current location of the subject residential property, then its $350K cash purchase price can be allocated to a non-depreciable asset ($50K) for the land and therefore, the remainder of the purchase price must be allocated to the tangible property in the range of ($100K - $150K) and to the intangible property in the range of ($150K - $200K).

330PIE® Intangible Property Valuation Method

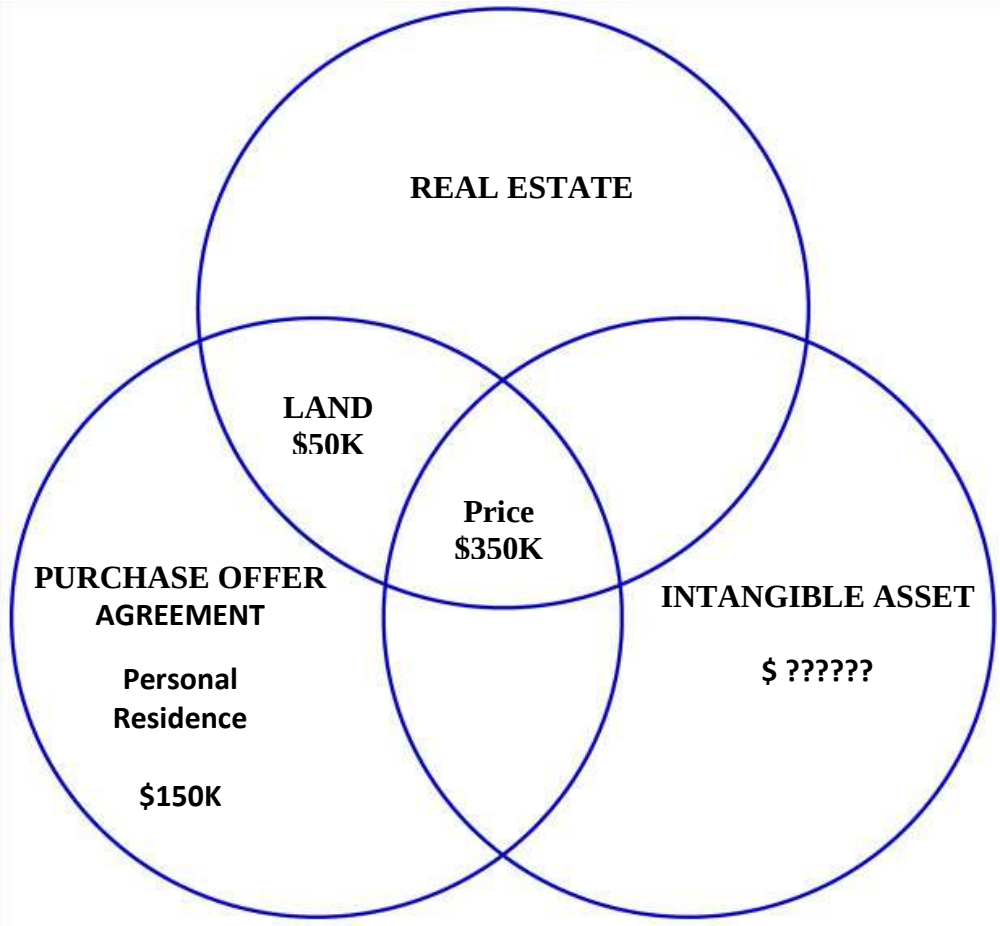

Figure 6

330PIE® Intangible Property Valuation Method

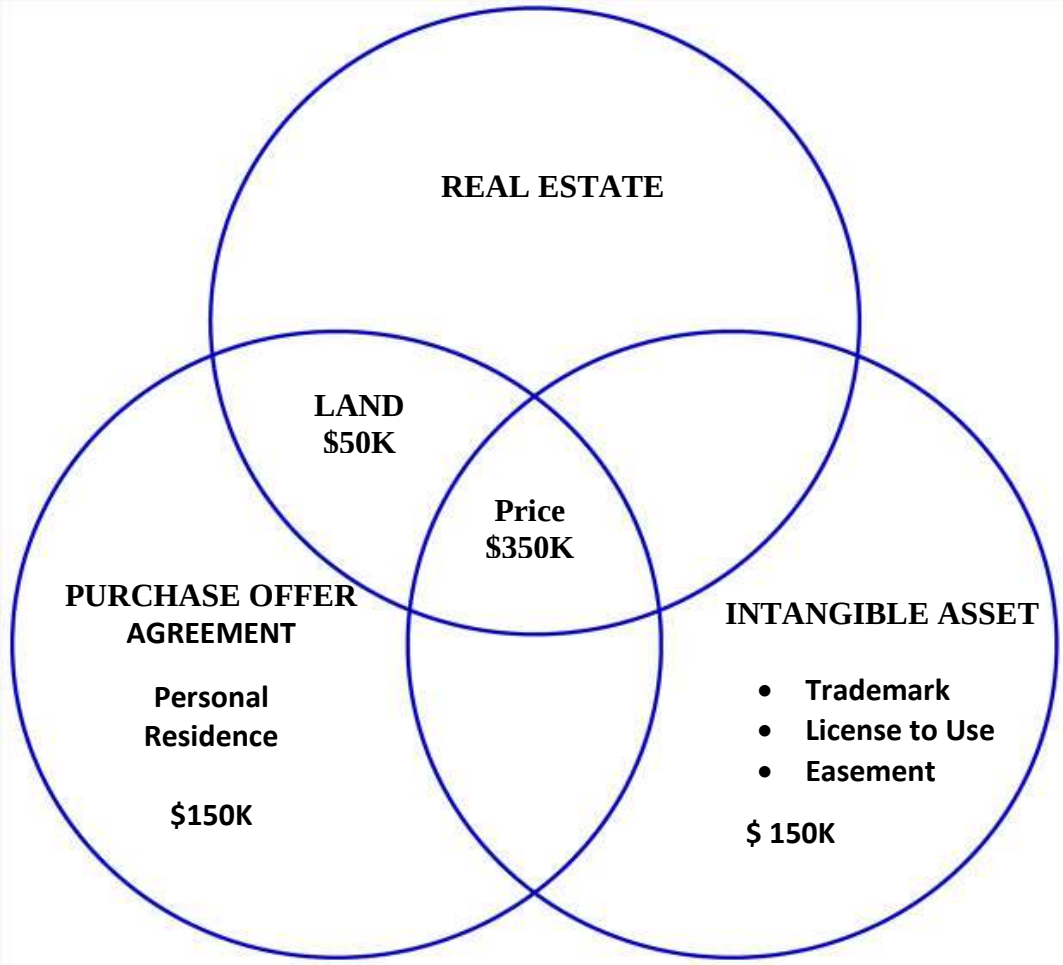

Figure 7

LINEAR ALGEBRA (MATRIX APPROACH)

In addition to the above intuitive approach, another way to evaluate this proposed solution is to using linear algebra and a 3 x 3 matrix approach This is shown below by creating a matrix (**A**) and then computing the inverse of this matrix, called A^{-1}, which is then multiplied together. By multiplying the original matrix by it inverse matrix, the resultant values will correspond with the coefficients that have been assigned to the land ($\mathbf{X_1}$), the tangible building ($\mathbf{X_2}$) and the intangible property ($\mathbf{X_3}$).

In the following example, it is assumed that a single family residential property was bought for $375,155 cash and that the land was acquired for $30K cash.

After subtracting the acquisition costs for the land ($30K) from the purchase price ($375,155), the remaining acquisition amount ($345,155) is allocated and assigned to the intangible property and the tangible property (home) in equal amounts ($172,577.50). The amount allocated to the building ($297,418) is taken from the property tax records.

An assumption is made that the price for a lot is cheaper ($15K) and that the house would sell for $100K ***less*** (or $275,155) if it was located in the worst part of town. Likewise, if a lot in the best part of town costs $45K , then it is assumed that the property would sell for $100K ***more*** in the best part of town ($475,155) - - then this information is used for comparison with the current location of the house.

The below 3x3 matrix "A" represents the acquisition costs for the land, building, and the intangible associated with the property in its current location (first row) and in the worst location (second row). The third row represents the acquisition costs for the land, building, and the intangible associated with the property in the best location. It is assumed that the intangible value is equal to a percentage (50%) of the Selling Price (Y). After determining the inverse of the matrix $\mathbf{A}^{-1}$ and multiplying it by the selling price, the resulting coefficients (shown in red) are then compared. The results reveals that the coefficient associated with the value of the intangible property in the worst part of town is "**0**" which is less than the coefficient for the value of the intangible property"**2**" if it was located in the best part of town - - relative to the property being located at its current located which shows a coefficient of "**1**"

AX = B **Linear Algebra (Matrix Approach)**

Land * x_1 + Building * x_2 + Intangible * x_3 = Y

	Land	Building	Intangible		X		Selling Price	Location	Year Sold
A =	30000	297418	172577.5		x_1		$ 375,155	Current	1/15/2020
	15000	183856	130077.5		x_2		$ 275,155	Worst	4/7/2020
	45000	328987	215077.5		x_3		$ 475,155	Best	10/1/2019

	Land	Building	Intangible
A^{-1} =	-3E-05	-6.7E-05	6.45985E-05
	2.44E-05	-1.2E-05	-1.21962E-05
	-3.1E-05	3.26E-05	9.78924E-06

1	Current Location
0	Worst Location
2	Best Location

SUMMARY

The current methodology and traditional approach use by appraisers to determine the value of a given subject residential real estate property is based upon the sales, cost, and income approach. Residential appraisal reports typically only list and name two specific categories of property as the basis upon which the appraiser renders their opinion of value regarding a given subject residential real estate property. These two category items are almost always tangible in nature and described as:

1) land; and
2) the tangible physical structure (house) that is present on the property.

Typically, the appraiser will assign and allocate a specific dollar amount for each of these two category items. For example, the report may state that the given subject residential real estate property has a value of $300K (USD) which is based upon assigning and allocating a value of $30K (USD) to the land and $270K (USD) to the physical structure (house) itself.

Seldom, if ever does a residential real property appraiser list, name, or provide any specific listing, name, item or category that is identified as "intangible property". Nor does the appraisal report ever state, ascribe, or provide any amount of value for the intangible component of the total property value of a given subject property based upon its actual physical location.

Epistemology is an area of philosophy that studies the nature of knowledge, the scope of knowledge, and justified belief. Within this area, there are two different types of knowledge. One type of knowledge usually discuss in epistemology is propositional knowledge - - which is "**knowledge-that**" a person has certain information and knows something, such as knowing that 1 + 2 + 3 = 6. The second type of knowledge is "**know-how**" which is knowledge that deals with

knowing how to do something, such as how to add a series of numbers together, how to fly an airplane, or how to fix a flat car tire.

Some property appraisers may provide both commercial and residential real estate appraisal services. The same appraiser "**knows-that**" the appraisal of a business enterprise that owns commercial real estate property has to take into account both the land, the physical real estate holdings, all of the tangible assets, and the intangible assets of the entire business in order to arrive at and render a valuation for the business.

However, the same appraiser seemingly fails to recognize, acknowledge, and assign or allocate a value for a residential real estate property and the intangible value of that property related to its actual physical location. Perhaps it is because there is a lack of "**know-how**" knowledge that is missing. Unfortunately, the current method and approach does not appear to provide the "know-how" knowledge that a professional appraiser could use for determining the intangible value associated with actual physical location of a given subject residential real estate property.

A number-theoretic model was proposed and used to demonstrate how propositional knowledge consisting of "knowing-that" there exists a finite number of ways to add summand terms together to obtain an integer is useful. By viewing the property value that is rendered by an appraiser as an integer called ***N***, then a given partition of this integer can be used to represent the specific components that had to be added together to obtain that value. The individual components can be specifically identified, named, listed, and categorized into a tangible or intangible property asset. Each summand term of a partition of an integer can then be assigned and allocated to either a tangible or an intangible property asset - - such as land, physical structure, license to use, easement, trademark, etc.

The total property value of a given subject residential real estate property cannot be accurately determined or relied upon due to the limited two-component summand representation given only for the tangible physical property assets, such as the land and the physical structure. Since the valuation is does not identify or recognize intangible property assets which also contribute to a property's overall value, then the traditional currently used method and approach actually leaves the property owner worst off. This is especially true because any intangible property owned by the property owner can be amortized and an annual amortization deduction can be claimed by the property owner resulting in a decrease or lower tax liabilities.

Therefore, if a number-theoretic model consisting of ***at least*** three-components is used, then one can list, name, itemize, and categorize each component as well as assign and allocate a certain amount of value to each component and the resultant sum will more accurately comport with economic reality and represent a value for the land, the tangible property, and the intangible property.

The number-theoretic model is scalable so that other categories of tangible property (i.e. personal property) and intangible property (i.e. easement, license, trademark, etc) can also be created, assigned and allocated a value, and prove useful for real estate valuation purposes.

DISCLAIMER:

The author is not an attorney, accountant, CPA, tax specialist, real estate agent, realtor, real estate broker, financial advisor, financial analyst, an appraiser, mathematician, or a statistician. All opinions expressed in the article are the author's. Any use of information from this article by the reader should be used after first consulting with their personal accountant, attorney, and financial advisor and the reader bears all responsibility for any potential or expected financial losses or gains.

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Appendix

The following is a list of other organizations and professional associations involved with and affected by real estate appraisals who may be interested in this issue:

- **Appraisal Institute** (www.appraisalinstitute.org). Offers the designation MAI and SRA.
- **National Association of Independent Fee Appraisers** (NAIFA) (www.naifa.com).
- **National Association of Real Estate Appraisers** (NAREA) (www.iami.org/NAREA/home.cfm).
- **National Association of Review Appraisers and Mortgage Underwriters** (NARA/MU) (www.iami.org/NARA/home.cfm).
- **National Association of Master Appraisers** (NAMA) (www.masterappraisers.org). It offers three designations: Master Residential Appraiser; Master Farm and Land Appraiser, and Master Senior Appraiser.
- **National Society of Real Estate Appraisers** (www.nareb.com/affiliates/society_appraisers.shtml).
- **American Society of Farm Managers and Rural Appraisers** (www.asfmra.org).
- **American Bankers Association** A trade organization for officers of commercial banks (www.aba.com).
- **American Institute of Architects** A professional association for architects, designers, and developers (www.aia.org).
- **American Institute of Real Estate Appraisers** A professional organization formerly associated with the National Association of REALTORS®. It merged with the Society of Real Estate Appraisers in 1991 to form the Appraisal Institute (www.appraisalinstitute.org). It awards two designations, the MAI (Member, Appraisal Institute) and SRA (Senior Residential Appraisal) to members who have completed rigorous experience and testing requirements. In common parlance, an MAI appraisal, being one performed by someone with the MAI designation, is supposed to be more accurate and more reliable than one prepared by a licensed appraiser without the MAI designation.
- **American Land Title Association** A trade association for the abstract and title insurance industry (www.alta.org).
- **American Motel Hotel Brokers Network** An association for real estate brokers who specialize in hotels, motels, resorts, casinos, bed and breakfasts, and assisted living facilities (www.amhbnetwork.com).
- **American National Standards Institute, Inc.** This organization (www.ansi.org) promulgates and oversees the implementation of a wide variety of standards, from acoustical devices to building measurements to livestock production. It also accredits programs that assess conformance to the ISO 9000 (quality) and ISO 1400 (environmental) management systems.
- **American Planning Association** A professional organization of regional and urban planners (www.planning.org).
- **American Real Estate and Urban Economics Association** An organization of scholars and practitioners

concerned with the economic analysis of real estate activities. The association publishes Real Estate Economics, the oldest academic journal concentrating on the real estate industry. The organization's Web site, www.areuea.org, includes a searchable database of article abstracts.

- **American Real Estate Society** Describes itself as an "association of real estate thought leaders dedicated to producing and disseminating knowledge related to real estate decision making and the functioning of real estate markets."Membership is open to anyone with an interest in real estate research. The society's Web site is www.aresnet.org.

- **Institute of Real Estate Management (IREM)** An affiliate of the National Association of REALTORS®, this association (www.irem.org) is devoted to the needs of multifamily and commercial property managers.

- **American Society of Appraisers** A professional organization of appraisers (www.appraisers.org).
    - It offers testing and accreditation in all appraisal disciplines, including
    - Appraisal review and management
    - Business valuation
    - Gems and jewelry
    - Machinery and technical specialties
    - Real property
    - Personal property

- **American Society of Farm Managers and Rural Appraisers** This association of farm managers; it added rural appraisers in 1936. It confers the designation ARA (Accredited Rural Appraiser). The organization's Web site is www.asfmra.org.

- **American Society of Home Inspectors (ASHI)** A professional organization for home inspectors, founded in 1976. It is North America's oldest and largest professional society of home inspectors. The organization's Web site is www.ashi.com.

[i] List of other organizations and professional associations involved with and/or affected by real estate appraisals.