Is Sustainability the 4th Form of Obsolescence?

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The long-standing theoretical approach for assessing the depreciated value of a building has commonly been linked to the identification, quantification and assessment of the effect of obsolescence. The future income streams of a property may be jeopardised if obsolescence is not recognised and dealt with in the management of the property. The value of the building is related directly to the degree of obsolescence evident in the building (Reed 2007; Myers 2009); accurately estimating the adverse influence on both the income levels and outgoings; particularly capital and operating expenditure, is critical. This is applicable to a wide range of land uses in the built environment including housing, commercial, industrial and retail (API 2007). Understanding what obsolescence is and how it exactly affects a property asset is critical although arguably is not fully understood outside the property field (Robinson et al. 2003).   Whilst there have been many other forms of obsolescence identified, there are traditionally three core forms of obsolescence that affects all buildings: physical, functional and economic. More recently the concept of 'sustainability' has evolved from a radical green sector to a broad term which is accepted in and embedded throughout all facets of our society. To what extent it is treated as an obsolescence, however, is unclear.

This paper discusses whether a new form of obsolescence has emerged, namely 'sustainable obsolescence' and whether its' addition to the traditional list of obsolescence is required. Whilst the term 'sustainable' is commonly perceived as relative to operating expenses and certification labels, there is a wider role that sustainability plays in our society. The concept of sustainable obsolescence applies to a broad range of considerations including the location of the property (locational sustainability), the amount of embodied energy in the building, the energy efficiency levels of the building and the degree of social sustainability. The debate about sustainable obsolescence must be conducted in light of the changing nature of the property market in wider society and increasing important issues such as corporate social responsibility, the higher profile of the environment and the increased importance of sustainability from view of stakeholders including the government and younger generations.   Already it is not possible to undertake a valuation of a property asset without a comprehensive understanding of exactly what sustainability is, how it is defined and how it relates to property.

Introduction

The concept of 'obsolescence' is an essential consideration during the assessment of value (Reed 2007). Although there has been an increased attention placed on the demand for sustainable buildings such as via the use of rating tools (Reed et al. 2009), the future income stream of sustainable properties including capital expenditure may be misunderstood if obsolescence is not adequately recognised and dealt with in property management. Although there are many forms of obsolescence, arguably the physical, functional and economic impairments remain the core types observed in property and result in depreciation, which in turn is a loss in property value (API 2007). Obsolescence may affect the land and/or building component in varying degrees, as well as commencing at different times and affecting the highest and best use (Lipscomb 2002). For example obsolescence may commence in the initial design phase and deterioration may start before construction has even started (Bole et al. 2009). Understanding exactly what obsolescence is and how it affects a property asset is critical although arguably not fully understood either inside and/or outside the property field (Laronge 2000; Robinson et al. 2003).

More recently the concept of 'sustainability' has evolved from a radical green sector to a broad term now accepted in and embedded throughout practically all facets of society, however the terms 'green' and sustainable' are often interchanged (Wilkinson et al. 2009a). This paper discusses obsolescence and sustainability with relevance to property value, by analysing if increasing importance of sustainability is (a) a new type of obsolescence or (b) embedded to varying degrees throughout existing forms of obsolescence. The underlying aim is to discuss types of obsolescence and their relevance to property valuation and investment. The objective is to highlight links between sustainability and valuation, where this area has received more attention in research circles although with somewhat limited reference to obsolescence and depreciation.

Definition of obsolescence

According to the Mirriam-Webster dictionary (2009) the broad definition of 'obsolescence' generally refers to the phase of growing old or becoming disused. There are two core meanings:

"1 (a) no longer in use or no longer useful **(b)** of a kind or style no longer current;

2 *of a plant or animal part* **:** indistinct or imperfect as compared with a corresponding part in related organisms."
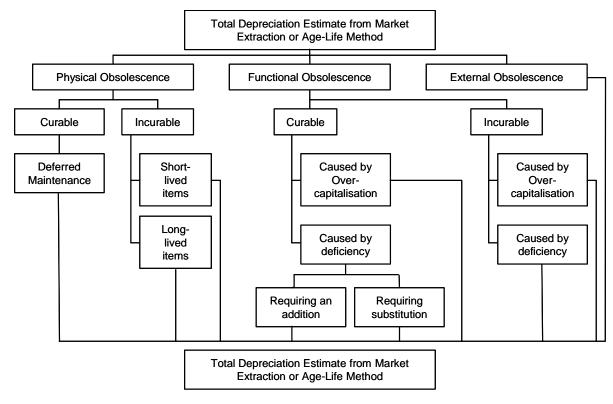
Both 1(a) and 1(b) are of relevance to property where the reference to 'use' has direct links to the fundamental property valuation concept of 'highest and best use' (Reed 2007). The relationship between highest and best use *and* land or site value may indicate whether an existing use is the highest and best use of the land.

From a property perspective, 'obsolescence' can be defined as "*a loss in value due to a decrease in the usefulness of property caused by decay, changes in technology, people's behavioural patterns and tastes, or environmental changes. Obsolescence is sometimes classified according to items of outmoded design and functionality, items with structural design unable to meet current code requirements, and factors arising outside the asset, such as changes user demand*" (API Glossary 2008).

Further consideration should be given to the type of property and also the allocation of value to the property components, such as the breakdown between the land and/or building components (API 2007). Since land value can be a major component of total property value, an opinion of land value is often developed separately even when valuing properties with extensive building improvements. In relation to obsolescence, land value and building value may change at different rates because improvements are practically always subject to depreciation although at varying rates, for example, retail property often depreciates at a faster rate than industrial property (Reed et al. 2009). With many valuations, a separate opinion of land value is required. Even though a total property value estimate may be derived in the direct comparison or income approach without separating land and improvement values, it may be necessary to estimate land value separately to isolate the value the land contributes to the total property value (API 2007). In the cost approach, the value of the land must be estimated and stated separately where each of these tasks must fully consider the relevance and effect of obsolescence and depreciation.

Forms of obsolescence

It is difficult to identify and accurately measure every form of obsolescence that affects property since each type of obsolescence affects different properties to varying degrees; furthermore each type may have commenced at a different time (Reed et al. 2008). At times there is substantial overlap between each type of obsolescence and this area is relatively 'grey'. As a starting point there are traditionally three core forms of obsolescence that affects buildings: physical, functional and economic as defined in the 'Valuation of Real Estate' (API 2007). The main difference between each type is highlighted in figure 1 when a distinction is made between the obsolescence being curable, the degree of over-capitalisation and the life of the good or asset. Many physical, functional, and economic considerations may not have any effect on the value of an improvement as recognised by the market on the date of value, but they will likely have a profound effect at some future time, say in 20, 50, or even 100 years (Myers 2009).

Figure 1. Components of Depreciation

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                    ┌──────────────────────────────────────┐
                    │   Total Depreciation Estimate from   │
                    │    Market Extraction or Age-Life     │
                    │               Method                 │
                    └──────────────────────────────────────┘
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┌──────────────────┐    ┌──────────────────┐    ┌──────────────────┐
│     Physical     │    │    Functional    │    │     External     │
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│ Deferred │ │ Short- │  │Caused by │          │Caused by │
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                    │   Total Depreciation Estimate from   │
                    │    Market Extraction or Age-Life     │
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(Source: API 2007)

Economic obsolescence

External or economic obsolescence is a loss in value caused by factors outside a property and often is one of the most challenging aspects to accurately measure (Crawford et al. 1994). Also it is often incurable (Pomykacz 2009). Economic obsolescence can be either temporary (e.g. an over-supplied market) or permanent (e.g. proximity to an environmental disaster). Economic factors frequently affect both the land and building components of a property's value where the current land value usually incorporates the effect of economic factors. Economic obsolescence usually carries a broader market effect and influences a broader range of properties, rather than just a single property. Economic obsolescence may affect only the subject property when its cause is location e.g. proximity to negative environmental factors or the absence of zoning and land use controls.

When market data is studied to develop an estimate of economic obsolescence, it is important to isolate the effect of the obsolescence on land value from the effect on the value of the improvements. In some situations, economic obsolescence may be attributed entirely to the land; however at other times it may be attributed entirely to the improvements. Often economic obsolescence can be allocated between land and improvements which is critical if economic obsolescence is already reflected in the estimate of land value.

Note that a building-to-property value ratio derived through market area analysis may be used to determine the loss in value to be allocated to the building.

The three primary methods of measuring economic obsolescence are:

• Allocation of market-extracted depreciation;

• Analysis of market data; and/or

• Capitalisation of an income loss.

Functional obsolescence

Functional obsolescence is caused by a flaw in the structure, materials, or design of the improvement when compared with the highest and best use and the most cost effective functional design requirements at the date of valuation. For example, a building that was functionally adequate at the original time of construction can become inadequate or less appealing as design standards, mechanical systems, and construction materials change over time. Functional obsolescence is attributable to defects *within* the property, while external or economic obsolescence is caused by external factors *outside* the property. Functional obsolescence, which may be curable or incurable, can be caused by a level of efficiency; this means that some aspect of the subject property is below standard in respect to market standards. It can also be caused by over-capitalisation. Since it can be a complex process to accurately measure functional obsolescence a five step process has been proposed as the best approach (Laronge et al. 2001).

Overall there are main five types of functional obsolescence:

• Curable functional obsolescence caused by a deficiency requiring an addition or installation of a new item;

• Curable functional obsolescence caused by a deficiency requiring the substitution or replacement of an existing item (i.e. 'curing a defect');

• Curable functional obsolescence caused by over-capitalisation that is economically feasible to cure;

• Incurable functional obsolescence caused by a deficiency or fault; and

• Incurable functional obsolescence caused by over-capitalisation.

Physical obsolescence

Generally all physical building components fall into one of three categories of physical obsolescence:

1. Curable physical deterioration

Curable physical deterioration is also known as 'deferred maintenance' and applies to items in need of immediate repair. Some examples include broken windows, a broken or inoperable HVAC system, carpet needing immediate replacement, a hole in an interior partition, or a cracked toilet cistern. For most

properties, deferred maintenance involves relatively minor items that are 100% physically deteriorated (i.e. not usable). The item must be replaced or repaired for the building to continue to function as it should. By definition, most repairs must be performed for the building to continue to function, so they are usually curable items.

There are two major tests of the curability of a physically deteriorated item:

Step 1. If spending the money to 'cure' the item will result in a value increment equal to or greater than the expenditure, the item is normally considered curable.

Step 2. If spending the money to cure the item will not result in a value increment equal to or greater than the expenditure but will allow other existing items to maintain their value, then the item is normally considered curable.

2. Incurable physical deterioration (short-life items)

Once any curable physical deterioration is estimated, the remaining physical deterioration is allocated to either short-life or long-life building components. Short- life items are those that are not ready to be replaced on the date of the opinion of value but will probably have to be replaced in the foreseeable (i.e. 'short-term') future. Examples include the carpet, air-conditioning and light bulbs. A short-lived item is not 100% physically deteriorated so it does not yet need to be cured. However, from an obsolescence perspective it is possible to draw the same conclusions that market participants do i.e. that the items will be 100% deteriorated before the end of the building's total useful life expectancy and therefore will have to be replaced. Thus, when those items reach the point of 100% physical deterioration, they become curable items. The same tests of curability that are applied to items of deferred maintenance are applied to short-lived items. Unlike items of deferred maintenance that have lasted beyond their useful life expectancy and need to be replaced immediately, the short-life items have generally not reached the end of their total useful life expectancy and are not completely deteriorated, but they are substantially depreciated in comparison with the overall structure.

3. Incurable physical deterioration (long-life items)

Long-life items include all items that were not treated as items of deferred maintenance or as short-life items. Long-life items are assumed to have the same age and life expectancy and therefore they are all treated together. Examples of long-life items include timber wall frames, underground piping, concrete slab foundations, and insulation. A long-life item is not 100% physically deteriorated, therefore is not obsolete and does not need to be cured. In addition, such an item is not normally replaced except under extraordinary circumstances e.g. if a foundation wall is damaged. The same tests of curability that are applied to the other physical components are also applied to the long-life items. The deterioration of long life items is measured by estimating an age-life ratio and then applying it to all components of cost that have not already been treated for physical deterioration.

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The primary techniques used to calculate the different types of depreciation include the following:

- Estimation of cost to cure, which is a measure used for curable physical deterioration and curable functional obsolescence;

- Application of an age-life ratio to measure curable physical deterioration and incurable physical deterioration for both short-life and long-life components;

- Application of the functional obsolescence procedure to estimate all types of functional obsolescence;

- Analysis of market data (e.g. paired sales or other techniques) which may be used to estimate incurable functional obsolescence caused by a deficiency as well as economic obsolescence; and

- Capitalisation of income loss, which may also be used to estimate incurable functional obsolescence caused by a deficiency as well as economic obsolescence.

An age-life procedure is shown in figure 2 which can be used to estimate all forms of physical deterioration, both curable and incurable. In addition to showing the correct way to estimate all items of physical deterioration, the diagram was designed to ensure that no items of physical deterioration are treated more than once. This age-life procedure works whether the breakdown method is being used to allocate a known total depreciation amount between its components or to develop an estimate of total depreciation.
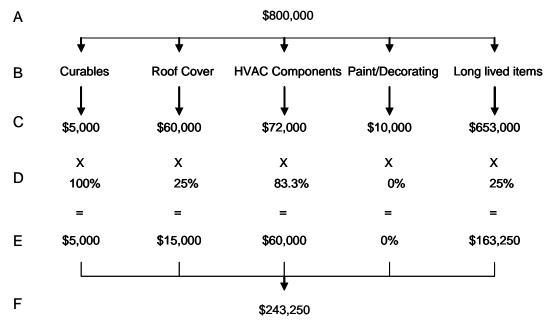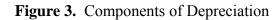
Figure 2. Age-Life Procedure for Estimating All Items of Physical Deterioration

(Source: API 2007)

Using a hypothetical case study, consider a 25 year old suburban commercial building with no sustainable features in average condition with an overall cost of $800,000 (see figure 3 for calculations). On inspection

it was determined that three windows were beyond repair and will cost a total of $5,000 to replace. The roof was replaced five years ago and has a 20 year guarantee; the cost to replace it is $60,000. The original HVAC components should last another five years, which indicates they are 83.3% deteriorated (25/30). The cost to replace the HVAC components is $72,000. The offices were just completely redecorated at a cost of $10,000 and it is estimated they will not have to be redecorated for another five years. Based on an analysis of demolition permits it is concluded that the total useful life expectancy of the long life items is 100 years. In this example, the total physical deterioration is the sum of the individual deterioration calculations are $5,000, $15,000, $60,000, $163,250 equating to $243,250.

Figure 3. Components of Depreciation

	A	$800,000			
B	Curables	Roof Cover	HVAC Components	Paint/Decorating	Long lived items
C	$5,000	$60,000	$72,000	$10,000	$653,000
D	X 100%	X 25%	X 83.3%	X 0%	X 25%
E	= $5,000	= $15,000	= $60,000	= 0%	= $163,250
F			$243,250		

(Source: API 2007)

In addition to these three primary types of obsolescence (i.e. physical, functional and economic), there are many other forms of obsolescence with selected examples listed here. Note a degree of overlap occurs between different types of obsolescence.

Technological obsolescence may occur due to the rapid advancement of the computer age. For example it may not be possible to use wireless computers in a building due to the design and construction of the building (API 2007).

Locational obsolescence may be due to changes in the geographical landscape e.g. a main road bypass is created which reduces the traffic passing a site (Reed 2007).

Social obsolescence is due to pressure from changing perceptions in society e.g. the sun reflections from glass covered buildings (Kraus et al. 2009).

Market obsolescence may occur due to changes in the market e.g. less need for a particular building use or good due to a changing demand (Meyer 1993).

Legal obsolescence due to changes in legislation e.g. a rezoning of property which affects highest and best use (Wilkinson et al. 2009a).

Building obsolescence relates to a property development being devalued due to the building component (Bryson 1997).

Historical obsolescence may occur if a property is deemed to be heritage listed with associated development restrictions (API 2007).

Professional obsolescence is when members of a professional body decide they no longer need to belong to that organisation (Smith 2004).

Sustainability and obsolescence

Whilst the term 'sustainable' is commonly perceived as relative to operating expenses and certification labels, there is a wider role that sustainability plays in society (Myers et al. 2008). The debate about sustainable obsolescence must be conducted in light of the changing nature of the property market in wider society and increasing important issues such as corporate social responsibility, the higher profile of the environment and the increased importance of sustainability from view of stakeholders including the government and younger generations (Reed et al. 2008). Whilst it has been acknowledged that various types of obsolescence exist and at varying degrees, there is little dispute that the profile of sustainability has increased recently and is a factor in many property decisions. Arguably it is not possible to make a property-related decision without some consideration about sustainability. Other examples of emerging influences can be drawn with sustainability:

1. asbestos: it is not possible to assess the value of an older building without evaluating the level of asbestos in the structure (or lack thereof). Prior to asbestos becoming a critical factor there was little influence on the level of obsolescence. If asbestos is confirmed, this perception (and respective legislation) this may render the building to be partly or 100% obsolete.

2. pollution: when cities and towns originally began it was possible for factories to dispose of effluent into streams and rivers as well as crease noise pollution, although over time became unacceptable. In turn the use was affected by obsolescence due to altered perception about pollution.

Refurbishment and modernisation can effectively extend a building's life expectancy by 'resetting the clock.' For example, consider a building with a 40 year economic life expectancy. If at the 10-year mark the property was substantially modernised, bringing the physical components up to current market standards for new construction, then the effective age of the property would be reset to zero and the remaining economic life expectancy (before the renovation) of 30 years would be reset to the original 40 years or to

some other figure, depending on the extent of modification to the property. Many historic properties have an economic life equal to or greater than the physical life of the building materials because of continued renovation and restoration (Myers 2009). Recycling existing building (as opposed to demolishing) is an area of sustainability has become increasingly important and is commonly referred to as 'adaptive reuse' (Wilkinson et al. 2009b).

Useful life as used in age-life calculations in the breakdown method is the period of time over which the components of the improvement may reasonably be expected to perform the functions for which they were designed. Although the physical life expectancy of some components, such as structural elements made of concrete and steel may be hundreds of years, the useful life recognises economic influences acting on the improvements containing these components. Accordingly, if a 40 year old industrial building is being demolished so that the site can be redeveloped it is probable that all components of the building will be demolished, regardless of their remaining physical utility.

The useful life of short-life physical components (e.g. HVAC components, roof covering, interior decorating, floor finishes) is usually shorter than the improvement's economic life expectancy. Long-life components (usually the structural components of a building, such as foundations, framing, and underground piping) have a useful life at least as long as the improvement's economic life expectancy. Distinguishing between long-life and short-life components is important when breakdown techniques are applied and gives the valuer flexibility in estimating component depreciation that is not available with the market extraction and age-life methods.

Perceiving sustainability as a new form of obsolescence

A recent study by Myers (2009) concluded investors are devaluing non-sustainable properties as a result of perceived increasing risks and obsolescence. Although, traditional theory suggests sustainability adds value, this research has found investors' concerns regarding the level of sustainability in their property portfolio and possible acquisitions. The issues identified by investors relate to lack of competitiveness of assets in the market, regulatory and legislative risks and increasing obsolescence in property not demonstrating a level of sustainability.

It has been found that all investors have not altered the traditional financial parameters and requirements in their investment analysis techniques to incorporate sustainability (Myers 2009). Investors have mandated property assets and acquisitions, regardless of sustainability levels, are required to achieve stipulated investment requirements and returns as set down by the organisation, fund or company. Investors, generally, have not altered their investment and acquisition models to incorporate sustainability and do not look likely to alter them in the immediate future. However, investors are incorporating capital expenditure requirements to upgrade property to more sustainable levels and are using payback ratios as a means of

financial justification. The issue of sustainability in commercial property portfolios, however, was of key concern to investors in ensuring maintenance of long-term values and returns from assets.

The majority of investors are examining the sustainability levels of their properties in portfolios, which is having ramifications on their asset strategies (Myers 2009). Investors were concerned with escalating resource costs, particularly for energy and water and security of supply. In addition the looming regulative and legislative policies, for example regarding emissions taxing, were of key concern to investors and they were focused on ensuring mitigation and limitation of potential downside risks that could affect the financial viability of the portfolio. Another key element of risk investors identified was the ability of the properties to secure future tenant demand, through the attraction and retention of tenants. Changing occupier needs and requirements, such as increasing corporate social responsibility requirements and carbon taxing, may be detrimental to properties which do not incorporate the desired attributes. As a result investors were apprehensive of the competitiveness of their properties in the future when other factors may engender the property obsolete. Investors' reactions to these potential risks were to ensure properties within their portfolio were future proofed against increasing costs and resulting obsolescence.

It has been found that some property investors assess sustainability levels in their property portfolios in order to identify assets deficient in required sustainability levels, based on portfolio or regulatory requirements (Myers 2009). These assets were dealt with either by upgrading or those properties unable to be made more sustainable without substantial cost, were earmarked for divestment or development. In addition, investors considered new acquisitions if the sustainability level required in the portfolio was not met since the cost of upgrading the asset to the required level was incorporated in the investment analysis. A property asset is discounted at acquisition in conjunction with divestment of non-sustainable assets that investors are concentrating on devaluing assets based on non-sustainability aspects, rather than identifying premiums for sustainability. This concurs with prior research examining the effect of sustainability in valuation methodology, which proposed lack of sustainability equated to devaluing of assets (Sayce et al. 2005). Although investors did not demonstrate sophisticated modelling or theory (e.g. see Sayce et al. 2005) theory, they focused on energy and other resource cost minimisation initiatives. Investors are very focused on sustainability as a result of potential risks and obsolescence in their property portfolios although valuers were not very adept at identifying this aspect and concern of investors (Myers 2009). In the same study valuers indicated regardless of sustainability that obsolescence had the least effect, out of a range of variables, on market value. However, the concept of obsolescence is important to the discussion of sustainability as obsolescence occurs when there is impairment to the desirability and usefulness of a property; this is brought about by technological changes or improvements in asset performance which makes properties not incorporating these evolutionary changes to become less desirable and valuable (Whipple 1995; API 2007). Investors are already motivated to 'future proof' assets to minimise obsolescence. Sustainability is considered a technological change affecting commercial property; therefore the potential

risks relating to demand, competition, and regulatory and legislatives issues may engender properties obsolete if action is not implemented to mitigate these issues.

Sustainability and its relationship to obsolescence has been confirmed as an increasing problem, where there is an increasing need to ensure properties will not have rapid or accelerated obsolescence due to non-sustainability (JLL 2007). Obsolescence theory suggests that this is a reasonable expectation. Arguably this could come from physical, functional and economic forms of obsolescence relating to technological, legal or social obsolescence, all of which are recognised forms of obsolescence (Baum 1991; Whipple 1995). These forms of obsolescence can be examined in relation to sustainability, where investors have already highlighted technological advancement and consequential performance of the property, the relationship to legal obsolescence and regulatory and legislative risks, as well as the need to remain competitive to prevent increased vacancy and ensure longevity of tenant attraction and retention (Myers 2009). .
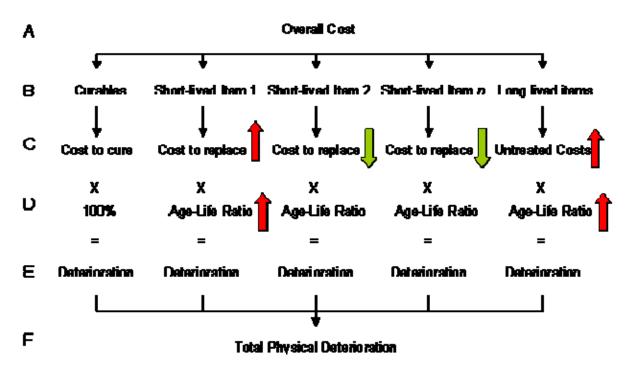
Obsolescence should be incorporated in valuation assessments and is inherently incorporated in the treatment of the initial and terminal yields (Baum 1991). Valuers arguably are not recognising the impact this may have on property values; an explanation may be because valuers require evidence to identify the effects of the change, and they need to be analysing the evidence with a focus on obsolescence (Myers 2009). Valuations are reliant on historical data and comparability of this data, as these form the primary justifications in the treatment of assumptions and use of heuristics within the valuation process. In addition, as valuers don't have a vested interest in the long term value of the properties (unlike investors) and valuation methods (like the DCF) tend to be based on short-term (10 years), the issues may not present itself clearly in valuation practice. The lack of consideration in valuation practice of obsolescence as found in this research, highlights the issue that valuers may not be looking for this issue or trend. Particularly if valuers are not using strategic knowledge to identify and be aware of this changing trend within the market and analysing the evidence for this element as it is deemed of little importance, then the reliance on expert intuition may leave the issue too late, resulting in major misreporting of values. This issue is only going to escalate as markets evolve and demand sustainability requirements, meaning that properties falling short of market demands for sustainability will be increasingly sensitive to increased risk and accelerating obsolescence (Parnell 2009). This may have possible major ramifications on the industry in years to come, as valuers awareness evolves of the issue too late and begin to implement newly formed heuristics in valuation practice causing a major disturbance in the market in the future.
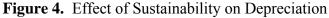
It has been demonstrated that obsolescence is clearly in investors' minds an indicator of potential action (Myers 2009). It is evident from this research sustainability is not about value adding, but preventing discounting and devaluing of property values as a result of non-compliance with industry demands of sustainability. Valuers at times appear to be misreading this important aspect of the function of the market (Myers 2009).

Embedding sustainability with physical obsolescence

One approach is to including sustainability into an analysis of obsolescence is to examine the effect on functional obsolescence. The model in figure 4 highlights the possible influence that sustainability has on cost and depreciation rates, where an upward facing arrow equates to a higher cost due to sustainability and a downward facing arrow equates to a lower saving due to sustainability. This can be further developed by considering the earlier case study building if it included a higher level of sustainability (figure 5). The 25 year old suburban commercial building with sustainable features in average condition cost the same amount to construct ($800,000). On inspection it was determined that three windows were beyond repair and will cost a total of $5,000 to replace. The roof is a green roof and was replaced five years ago and has a 20 year guarantee; the cost to replace it is $120,000 although depreciates faster due to higher maintenance needed. The original HVAC has been replaced with water condensers ($36,000) and should last another five years, which indicates they are 83.3% deteriorated (25/30). The offices are sustainable and partly unpainted at a cost of $5,000 and it is estimated they will not have to be redecorated for another five years. Based on an analysis of demolition permits it is concluded that the total useful life expectancy of the long life items is 100 years.

Figure 4. Effect of Sustainability on Depreciation

(Source: based on API 2007)

In this example, the total physical deterioration is the sum of the individual deterioration calculations are $5,000 $42,000, $30,000 and $297,500 equating to $374,500. This contrast with depreciation of $243,250

for a non-sustainable building equating to a difference of $131,250 being a higher rate of obsolescence. Note this scenario has not given any consideration to other considerations including:

- higher rent due to increased demand for the perceived benefits of tenancy in a sustainable building;

- attracting government tenants who are restricted to leasing only sustainable buildings; and

- indirect benefits such as lower running costs (i.e. for a gross lease).

Figure 5. Components of Depreciation incorporating Sustainability

(Source: based on API 2007)

Concluding remarks

In recent times the perception of sustainability in the built environment by tenants, investors and developers has changed. Whilst many studies have examined new building and the high-tech approaches to energy efficiency, relatively little consideration has been given to the long-term relationship between obsolescence and property value. This is largely due to the recent adoption and acceptance of sustainability in property over the past five years, especially commercial property where a discounted cashflow covers at least a ten year period. Hence there has been a distinct lack of market evidence to permit a detailed analysis of obsolescence and depreciation over time. This research is ideally undertaken with new buildings although the world's first 6 star office building (Council House 2 in Melbourne) was only completed in 2006 for example (Reed 2007).

The relationship between obsolescence and property value needs to be closely monitored and then further examined when more data is available. This paper has demonstrated the area of obsolescence and depreciation is based on a sound body of knowledge although is in a constant state of change. The arrival of the computer age is a good example of the built environment adapting to rapid change.

Regarding the question of whether sustainability is a new type (4th) of major obsolescence, there remains additional research to be undertaken when reliable data is available. The samples size of sustainable buildings is too small to draw a meaningful inference. This discussion has demonstrated that sustainability can be embedded within existing obsolescence (e.g. functional obsolescence) although in the future it may also be viewed as an additional form of obsolescence. The determining factor here will be the availability of reliable market data about sustainable buildings. At this point in time further research is encouraged and this question should be revisited.

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