Framework for integrating sustainability issues into valuation of non-market industrial real estates

Abayomi Ibiyemi*, Yasmin Mohd Adnan and Md Nasir Daud

Department of Estate Management, Faculty of Built Environment, University of Malaya, 50603 Kuala Lumpur, Malaysia
Email: yomi1004@googlemail.com
Email: yasmin_alambina@um.edu.my
Email: mdnasir@um.edu.my
*Corresponding author

Abstract: This paper builds upon earlier studies and viewpoints relating to sustainability in real estate valuation, summarising the key results into three major valuation approaches. These approaches focused mainly on commercial and residential properties, excluding specialised industrial properties, for which no market-based evidence exists for their valuations. The paper closes the gap by venturing to provide a framework and valuation approach for integrating sustainability issues into non-market industrial real estate valuation. It finds a conceptual framework and a non-market valuation approach that should encourage firms to invest in sustainability, and assign scarcity value to environmental absorptive capacity. The study proposes a Delphi technique which attaches a sustainability obsolescence factor to an industrial operation relative to the appropriate sustainability criteria set by the local green rating or environmental authorities. It concludes that there is an impact-compliance dimension to sustainability in real estate valuation, and that appraisers should give sustainability-compliant opinions to their clients to drive sustainability.

Keywords: sustainability; industrial valuation; non-market value; value-in-use; environment; externality.


Biographical notes: Abayomi Ibiyemi is a doctoral student of the Department of Estate Management, Faculty of Built Environment, University of Malaya, Kuala Lumpur, Malaysia. His research interests include real estate valuation, property appraisal, sustainability, facilities, and environmental resources management.

Yasmin Mohd Adnan received her PhD in Estate Management from the University of Malaya, Kuala Lumpur, Malaysia. She is currently a Senior Lecturer at the Department of Estate Management, Faculty of Built Environment, University of Malaya, Kuala Lumpur, Malaysia. Her research interests include real estate economics, sustainability, property development, and research methods. She is currently the Chief Editor of the International Journal of Property Science.
1 Introduction

Human-induced climate change, with such rapid and continuing global-scale warming, is now at a critical stage and signifies that human pressures on Earth’s life-supporting natural systems now exceed the planet’s bio-geo-capacity. McMichael (2014) affirms that the risks from climate change to health and survival in populations are as diverse, as are the social and political ramifications. Although attributing observed health changes in a population to the recent climatic change is difficult, a coherent pattern of climate- and weather-associated changes is now evident in many regions of the world. The risks impinge unevenly, especially on poorer and vulnerable regions, and are amplified by pre-existing high rates of climate-sensitive diseases and conditions. In the likely event that world temperatures warm up by +3–5°C by 2100, the corresponding direct health consequences, and socio-economic disruptions will be severe. In 2008, Friedman stated that small increases in global average temperatures should have a big effect on weather, because drivers of winds and their oscillation patterns on the surface of the earth are differences in temperature. So when human activities correlate with upward movements in average surface temperatures of the earth, we unwittingly alter wind patterns, and the rates of evaporation – which is the key reason why we get more intense rain and snow storms in some places and hotter dry spells and longer droughts in others. As the population of the world continues to grow, and urbanisation patterns accelerate, our actions in daily life necessitate a better understanding of resource allocation and the impact of that allocation on our environment.

Manufacturing industries, in particular, are confronted with a major new challenge for sustainability due to energy and natural resources depletion, devastating global environmental deterioration, and human beings pursuing higher life quality. Evidently, there is a critical need that manufacturing processes in products development be sustainable in their operations. It is a major component of civilised development to provide high quality human living standards through manufacturing and technology innovations, but these are also the main sources of consuming natural resources with toxic by-products and wastes, often detrimental to the environment. In this context, the global research community has to develop new methods and metrics for sustainable manufacturing and development (Bansal, 2005). Industrial properties are those used for manufacturing products or to store raw materials. They can be classified into factory-office multiuse, factory-warehouse multiuse, heavy manufacturing buildings, industrial parks, light manufacturing buildings, and research and development parks. They differ from office and residential buildings by their having special purpose designs and construction, heterogeneous nature, relatively shorter physical life spans due to
Intensity of use, difficulty in adapting to new uses, dependability on trade conditions, and faster physical deterioration.

The theoretical basis for the integration of sustainability considerations into the property valuation process began in 1996 (Harrison and Seiler, 2011; Lorenz and Luetzkendorf, 2011). In the scheme of sustainable development, the real estate sector has a great role to play. Property and construction in the Organization of Economic Cooperation and Development (OECD) countries alone accounted for 24–40% of total energy use, 30% of raw energy use, 30–40% of solid waste generation. The sector holds the largest single share of global environmental degradation and impairment of quality of life (OECD, 2003; Lorenz, 2006). IPCC (2007) confirmed that buildings represent the best opportunity to make significant reductions in greenhouse gas emissions while maintaining economic growth; and estimated that by 2020, CO₂-emissions from building energy use can be reduced by 29% at no extra cost. In his 2006 study, Lorenz emphasised that actors within the property market, including property researchers are slowest in responding to challenges imposed by sustainable development, and that efforts in achieving success in future would be dependent on progress that can be made in integrating sustainability issues into property valuation theory and practice. Sustainability in real estate is an evolving body of knowledge, for which there is a need for extensive analysis, unbiased, evidence-based researches in individual and broader markets to provide guidance, and knowledge of the implications and applicability of sustainability for the broader valuation profession (Myers, 2012).

A conceptual framework and the suggested valuation approach is an option for real estate valuers to integrate sustainability issues into the valuation of non-market industrial real estate, by making allowance for sustainability obsolescence.

The study focus is need-based, and it is directed at identifying and understanding sustainability issues from the non-market impact-based perspective, with valuation serving as the instrument of creating disincentives for further CO₂ emissions and externalities. Therefore, it examines the value of sustainability from the compliance-impact of industrial operations relative to the prescribed sustainability standards. This concept complements existing internalising programmes (pollution taxes, credits and subsidies) as an incentive to industrial firms to set new productive capacity limits, and assign scarcity value to environmental absorptive capacity in the absence of a sustainability market. It is not intended to measure corporate industrial sustainability from the market-based perspective nor assess potential benefits on sustainability performance of industries in relation to their investment business values. Where, for instance, corporate industrial sustainability does not exist upon which credible business valuation can be based, the appraiser ought to avoid introducing green bias to the valuation process since non-sustainability has not become a value risk factor, and there may be no data to show that industrial business property pricing is distinguishing between sustainability features and associated performance. RICS (2009), Runde and Thoyre (2010) reinforced this position when they emphasised that the influence of sustainability on market value is dependent upon the degree to which the specific market values sustainability. In many markets, building obsolescence and value depreciation as a result of changing occupier preferences and corporate social responsibility objectives have not been recognised as tangible factors by industrial firms. This is an essential point to note in order to avoid introducing an unintended green bias into the valuation process.
Runde and Thoyre submitted further that the appraiser who views green as good in a market that has not yet indexed it, is introducing bias to the valuation process. Second, non-market industrial real estate are specialised, and seldom change hands in the market, hence, non-market values are often computed for them for financial statements. Corporate industrial sustainability in business valuations and other related issues that approach sustainability from the economic perspectives is not within the scope of this paper.

2 Review of literature

Environmental impacts have to be measured in relation to human and natural systems that are likely to be affected such as:

- extent of change in water quality, freshwater flow, and ambient air quality
- extent and duration of external disturbances – noise, smoke, dust, fume during operation and traffic movement
- extent of habitat loss and effects on biodiversity
- change in plant and animal productivity
- loss in environmental service levels, such as waste assimilation, and erosion control
- health decline
- aesthetics decline
- loss of physical amenities
- loss of cultural and political identity.

According to Commoner (1971) and Munn (1979), human activities strive to exploit, control, or otherwise ‘improve’ upon nature for the perceived benefit of humanity. However, in the process, the myriad of limit values in nature have been optimised and are continually adjusted by evolution. The conservation of mass principle and the first law of thermodynamics (conservation of energy) dictates that material resources or energy when moved around or manipulated by technology, results in inescapable negative environmental consequences. The second law of thermodynamics asserted that order can be increased within a system (such as the human economy) only by increasing disorder or entropy outside the system (the environment). Thus, technological innovations may have created ‘order’ in the human economy as manifested in buildings, factories, transportation networks, and communication systems, but it is at the expense of increasing ‘disorder’ in the environment. This disorder or entropy is likely to be correlated to negative environmental impacts (Faber et al., 2012; Kümmel, 1989; Huesemann and Huesemann, 2011).
It has been argued that the social and economic benefits (impacts) derivable from end-production of industrial processes justify the resulting environmental damage, but Ibiyemi (2004) reminded that many environmental effects are persistent, sometimes devastating, and often irreversible. He noted that industrial process operations hardly produce positive impacts on the ecosystem, and that the so much touted socio-economic impacts are transitory, and is soon to create wastes that are detrimental to the environmental media. As most environmental impacts are directly harmful to the ecosystem, attempts must be made to limit their occurrence. Since socio-economic impacts create those conditions that may further harm the ecosystem, there is also the need for balance. In 1992, Aina listed environmental degradation factors that can result in loss of property values, such as sitting errors, lack of consideration for climate in property decisions, construction, and lack of use of plant materials. He remarked that pollution has the greatest effects. Gaseous emission of CO₂, oxides of sulphur, (SOₓ) and nitrogen (NOₓ) and halons, when combined with atmospheric moisture fall as acid rain. Acid rain has corrosive effects on building materials, such as marble, ferrous and non-ferrous copper, aluminium, zinc, leather, paper, rubber and ceramics. During the dry season, black sooth and particulate matter from asphalt and cement works settle in still air on properties as deposits to make their colour unattractive, forming abrasive blasts in windy conditions. By 1986, according to Otegbulu (1992), Nigeria alone was flaring 16.8 billion cubic metres of natural gas a year, resulting in annual emission of 2700 tonnes of particulate matter, 160 tonnes of SOₓ, 5,400 tonnes of carbon monoxide (CO) and 27 tonnes of NOₓ. At one of the flow stations, gas flaring led to 100% loss in the yield of all crops cultivated about 200 metres from the flow station, 45% loss for crops 600 metres radius and 10% for those one kilometre away. Pollution also affected the income on land by reducing the farm yield or impacting the health of the farmers. Blasting of limestone affects building foundations and cause cracks on their walls. In mining areas, pollution affects foundations, causing increases in cost – in-use arising from frequent repairs. Some industrial solid wastes exude obnoxious odours which are very repulsive to man. He noted that obnoxious odours led to the immigration of poor classes and emigration of high class tenants in neighbourhood properties. He elicited a shifting land value pattern due to pollution. Pollution threatens groundwater quality and the supply of drinkable water facilities to man and property. Noise pollution may result in hearing loss and its vibrations may also threaten building foundations and walls (Asaju, 1992).

According to Cameron and Treasury (2007), items of property, plant and equipment that are unable to be reliably valued using market-based evidence for the same or a similar asset are referred to as specialised properties. These assets are those that are rarely, if ever sold except by way of a sale of the business of which they are a part; due to their uniqueness, specialised nature and design of the buildings, configuration, size or location or other factors. They highlighted other key characteristics of specialised assets as:

1 usefulness to a limited number of users or uses
2 earn revenue that has not been derived from an open market transactions and for which market-based evidence does not exist
3 they have to be sold along with their tangible and intangible assets and liabilities.
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In general, specialised assets are those assets that, due to some specialised physical or geographical factors, offer very little utility for any purpose other than that for which they were originally designed (Maninggo, 2010; Brown, 1991; IVSC, 2010).

In assessing the value of industrial and manufacturing facilities as part of a going business, the sales comparison, income and cost approaches can be used depending on the nature of the assets and information available (ANZ, 2010). However, in the unlikely event that comparable sales evidence exists, the value to the owner may be determined (Brown, 1991; ANZ, 2010). Income capitalisation and discounted cash flow analysis have the same limitation of rarity of comparable evidence (RICS, 2008; ANZ, 2010). The cost approach is the most commonly used valuation approach, with a statement incorporated within the valuation report that the indicated value is, either subject to a test of adequate potential profitability, or service potential for private and public sector entities respectively (Brown, 1991; Maninggo, 2010; ANZ, 2010; RICS, 2014).

The procedure can be briefly summarised as

1. estimating the value of land as if vacant, by comparative analysis to determine market value for existing use (MVEU)

2. estimating the current cost of reproducing or replacing the existing buildings and structures, and deducting there from the estimated accrued loss in value on account of physical deterioration, age, functional and economic obsolescence.

Deduction of accrued depreciation estimate from current reproduction or replacement cost is done to arrive at an indicated value when added to the MVEU of land. Plant, machines and equipment (PME) also are valued by the depreciated replacement cost (DRC) basis, except for the PMEs which are out of use, surplus to the business obsolete, or held for investment purposes. The machines fully installed and operational, i.e., including transportation and foundation, consultants’ fees, and commissioning costs, while elements of betterment in efficiency are adjusted for. The values-in-use of the PME is assessed by depreciating the replacement cost, taking account of physical, economic, functional/technological obsolescence. For importation purpose, the estimate the replacement cost of each item of PME is calculated by reference to landed cost (factory) plus cost of installation:

\[
Landed \text{ Cost (Factory)} = C.I.F + \text{Import duty} + \text{Surcharge on duty} \]
\[
+ \text{Transportation to Factory} \]
\[
+ \text{Installation} = \text{Replacement Cost;}
\]
\[
C.I.F(\text{Cost, Insurance and Freight}) = F.O.B + \text{Insurance}
\]

and

\[
\text{Freight; F.O.B(Free on Board)} = F.A.S + \text{Loading Charges;}
\]
\[
F.A.S(\text{Free alongside Ship}) = \text{Ex-showroom} + \text{Transportation to Port.}
\]

The overall depreciation allowance is based on efficiency and service potentials of each of the PME in relation to its contribution to the business (Derry, 2008).

Sustainability means living within the limits of what the environment can provide, while understanding the many interconnections between economy, society and the
environment, and the need for the equal distribution of resources and opportunities. Sustainable development consists of a long-term, integrated approach to developing and achieving a healthy community by jointly addressing economic, environmental, and social issues, whilst avoiding the over consumption of key natural resources. United Nations General Assembly (2005) resolved to promote the integration of sustainable development using three component indicators – economic, social development and environmental protection. These indicators were later referred to as the triple bottom line (TBL). The Venn diagrams in Figure 1 indicate that the TBL of sustainability are not mutually exclusive, but mutually reinforcing. The TBL has served as a common ground for numerous sustainability standards and certification systems in recent years. Standards which today explicitly refer to the TBL line include Rainforest Alliance, Fairtrade and UTZ Certified, and the ISEAL Alliance – the global association for social and environmental standards (SAI Platform, 2010; Alvarez, 2011; Reinecke et al., 2012).

**Figure 1** Venn diagram illustrating the triple bottom line (see online version for colours)

![Venn diagram illustrating the triple bottom line](http://www.verifyssustainability.com/Pie%20diagram/PieDiagram_open_page.aspx, 2014)

Figure 1 aptly depicts the inter linkages and interactions among the economic, social and environmental pillars of sustainable development. The economic approach to sustainability is based on the Hicks-Landahl concept of the maximum flow of income that could be generated while at least maintaining a good stock of assets (or capital), which yield these benefits (Solow, 1986; Maler, 1990; Alvarez, 2011). This is based on the underlying concept of optimality and economic efficiency applied to the use of scarce resources. The social concept of sustainability is people-oriented, and seeks to maintain the stability of social and cultural systems, including the reduction of destructive conflicts (Munasinghe and McNeely, 1995; Alvarez, 2011). Equity is an important aspect of this approach. Preservation of cultural diversity and cultural capital, and the better use of knowledge concerning sustainable practices embedded in less dominant cultures, are
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desirable. Modern society would need to encourage and incorporate pluralism and grassroots participation into a more effective decision-making framework for socially sustainable development. The environmental view of sustainable development focuses on the stability of biological and physical systems (Munasinghe and Shearer, 1995; Alvarez, 2011). Of particular importance is the viability of subsystems that are critical to the global stability of the overall ecosystem. Furthermore, ‘natural’ systems and habitats may be interpreted broadly to also include man-made environments like cities. The emphasis is on preserving the resilience and dynamic ability of such systems to adapt to change, rather than conservation of some ‘ideal’ static state. Natural resource degradation, pollution, and loss of biodiversity reduce system resilience. Reconciling these various concepts and operationalising them is a major challenge, since all three dimensions must be given balanced consideration. The interfaces between the three pillars are also important. The economic and social elements interact to give rise to issues such as intra-generational equity (income distribution) and targeted relief for the poor. The economic-environmental interface has yielded new ideas on valuation and internalisation of environmental impacts. Finally, the social-environmental linkage has led to renewed interest in areas like inter-generational equity (rights of future generations) and popular participation. However, tradeoffs will always be necessary depending on the complexity of issues being addressed, the circumstances and the current state of knowledge. The foregoing suggests a broad integrated conceptual approach in which the net benefits of economic activities are maximised, subject to the maintenance of the stock of productive assets over time, and providing a social safety net to meet the basic needs of the poor. Sustainable development therefore calls for integrating economic growth, social development and environmental management as interdependent, mutually supportive and reinforcing pillars of long-term development. It calls for participatory and multi-stakeholder approaches to dealing with development issues, involving a wide range of actors-government, private sector, civil society organisations, institutions of higher learning and research and development partners.

In 2012, Myers synthesised the plethora of research that has been undertaken into the relationship between sustainability and market value in real estate, by critically analysing the researches and the applicability of sustainability and value research in valuation practice. She found that existing researches conducted into the relationship between sustainability and market value are insufficient to establish concrete sustainability valuation theories for practice, and that there is lack of historical evidence and information on the quantifiable effects on market value of this recent trend. The reports of RICS (2009) and Bambagioni (2013) insisted that sustainability characteristics of buildings must be taken into account within property valuations and risk analyses, and their effects quantified and described in writing within the report. Luetzkendorf and Lorenz (2012) agrees that sustainability aspects can be integrated into existing methods of valuation and risk analyses, with the responsibility of quantifying it in specific local environment resting with the valuation professional. They emphasised the transparent consideration of sustainability features in the Valuation Report, and provided a checklist that included energy efficiency, environmental risks, resource use, recyclability, indoor air quality, user-needs, comfort and satisfaction, serviceability and health friendliness.

The major approaches that have been provided by literature for accounting for sustainability in real estate valuation are summarised in Table 1.
<table>
<thead>
<tr>
<th>Researchers</th>
<th>Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>RICS valuation Information Paper 13, (VIP 13) (2009), and RICS (2011)</td>
<td>Sustainability should be built into the valuation calculation. It should be incorporated into any DCF with consideration for aspects of uncertainty. It prescribes elements of comparison as a checklist when the DCF adjustments are to be made, while considering whether the market is prepared to pay for them. Where difficult to quantify, valuer can use a quantitative approach. Valuers should expand their data to include sustainable features. No new method should be used. There must be transparency.</td>
</tr>
<tr>
<td>Runde and Thoyre (2010)</td>
<td>Valuation based on the prescribed conventional method of valuation, with cost of externalities internalised. i.e., less cost of externalities</td>
</tr>
</tbody>
</table>
| Compilation of literature of suggested approaches by from 1996 to 2007 by Luetzkendorf and Lorenz (2012) that included the works of Boyd and Kimmet (2005), Luetzkendorf and Lorenz (2005), Boyd (2006), Reed (2007), Myers et al. (2007) and Muldavin (2010) | a) The direct adjustment of single valuation-input parameters such as gross or net rents, risk premiums within the determination of discount and capitalisation rates, maintenance costs and other capital expenditures, lease terms and lease provisions, growth rates, marketing costs and marketing time frames, and depreciation.  
b) Relevant sustainability features must be quantified appropriately and integrated to the methods of valuation. The consideration of sustainability features must be transparent  
c) Lump-sum adjustments on the preliminary valuation result  
d) The calculation of a sustainability-correction factor to adjust the preliminary valuation result |
| Luetzkendorf and Lorenz (2011) | Replacement cost or income approach to obtain the market value, and less market adjustments for sustainability issues (regarded as risks) and the modified discounted cash flow.  
Comparable sales: |

\[
\text{Market Value} = \frac{\sum (c_1 \times c_2 \times c_3 \times \ldots \times c_n \times K_{ij} \times w_j \times (c_0))}{\sum w_j}
\]

Explanatory:  
\(c_1, \ldots, c_n\) - Correction factors (e.g. to adjust for differences in location, building permissions, layout, conditions, energy-efficiency)  
\(K_{ij}\) - Observed comparable sales  
\(w_j\) - Weight of adjusted comparable sales  
\(e\) - Market correction factor (shall be applied only when value-influencing circumstances cannot be considered within the other valuation-input parameters)
### Table 1: Summary of major sustainability valuation approaches (continued)

<table>
<thead>
<tr>
<th>Researchers</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Luetzkendorf and Lorenz (2011):</td>
<td>Depreciated replacement cost</td>
</tr>
</tbody>
</table>

**Market Value**

\[
\text{Market Value} = \left( \frac{\text{BC} - \text{RS} \times \text{D}}{\text{OS}} - \text{D} \times \text{OVC} + \text{LV} \right) x (c_p) 
\]

- **Explanation:**
  - **BC:** Replacement costs
  - **RS:** Remaining lifespan over lifespan = Depreciation factor due to age (linear depreciation)
  - **D:** Depreciation due to building damage, defects, maintenance backlog
  - **OVC:** Other value-influencing circumstances (e.g., functional obsolescence, environmental obsolescence)
  - **LV:** Land value
  - **c_p:** Market correction factor (shall be applied only when value-influencing circumstances cannot be considered within the other valuation input parameters)

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**Income approach:**

\[
\text{Market Value} = \frac{(\text{Gt} - \text{OCT})}{(\text{r}_0 + \text{np} - \text{g} + \text{d})}
\]

- **Explanation:**
  - **Gt:** Gross rental income per year
  - **OCT:** Operating costs not attributable to tenants
  - **\( \text{r}_0 \):** Risk-free rate
  - **np:** Risk premium
  - **g:** Growth rate
  - **d:** Depreciation
  - \( (\text{r}_0 + \text{np} - \text{g} + \text{d}) \): All Risk Yield (ARY)
Table 1  Summary of major sustainability valuation approaches (continued)
2.1 Initiatives for older buildings and retrofits

Miller and Buys (2008) offered a beginning point for understanding the difficulty of integrating sustainability initiatives in older buildings. They explored the social dimension, and asserted that incorporating sustainability in the refurbishment process of older buildings could present technical, financial and social challenges from the perspectives of commercial office building tenants. However, they argued that there would always be a place for older non-sustainable buildings, or that most buildings would have to be retrofitted at some point to meet market expectations. Retrofitting was viewed as a way to ‘future-proof’ for this inevitable change. Some felt that older commercial buildings could not be brought up to the ideal green standard and thus should be either demolished or turned into other uses. Others suggested that as sustainable buildings become mainstream, there may be a ‘non-sustainability discount’ for residing in a building without sustainable features. In 2014, Benderwald et al. presented their guide to owner-occupiers, on how to calculate and present deep retrofit value to addresses prevailing uncertainties predicted by Miller and Buys (2008), and the expectation is that company executives and building professionals would be able to incorporate the benefits of deep retrofits in their decision making.

2.2 Externalities and cost internalisation

In economics, an externality is the cost or benefit that affects a party who did not choose to incur that cost or benefit (Buchanan and Stubblebine, 1962). Manufacturing activities that cause air pollution impose health and clean-up costs on the whole society and if external costs exist, such as for pollution, the producer may choose to produce more of the product than would be produced if the producer were required to pay all associated environmental costs. If there are external benefits, such as in public safety, less of the good may be produced than would be the case if the producer were to receive payment for the external benefits to others. Overall cost and benefit to society, according to Laffont (2008) is the sum of the imputed monetary value of benefits and costs to all parties involved, but for goods with externalities, unregulated market prices do not reflect the full social costs or benefit of the transaction, except by internalisation. Each component of industrial processes – land, buildings and structures, PME, user satisfaction, pollution control measures – would have to be examined in the light of all relevant sustainability indicators with their sustainability obsolescence related to established command and control (CAC) and technology standards in order to measure the degree of non-compliance in monetary terms.

There are many forms of obsolescence, but traditionally, three forms affect all properties: physical, functional and economic. Others include technological, locational, legal, and historical obsolescence. The concept of sustainability obsolescence is evolving from the green sector (Reed and Warren-Myers, 2010). ‘Sustainability’ obsolescence applies to a broad range of considerations that spans through the TBL expression of sustainability. The study of Myers (2009) concluded that investors are devaluing non-sustainable properties as a result of perceived increasing risks and obsolescence. They argued that investors focused on potential risks and ‘sustainability’ obsolescence that could arise in their property portfolios, but valuers indicated that obsolescence had the least effect on market value relative to other variables. API (2007) and Parnell and Sayce (2009) had postulated about the same time that properties not incorporating
sustainability changes may become less desirable and valuable, because as the markets evolve, sustainability requirements are demanded and properties that are unable to respond to sustainability demands will have their obsolescence accelerated due to insensitivity. Baum (1991) also recognised obsolescence and insisted that it should be included in valuation assignments and inherently incorporated in the treatment of the initial and terminal yield.

This literature review has examined briefly, what other researchers have said that have relevance to the problem being investigated, and has provided some information on techniques to be used. This researcher agrees with their proposition to integrate sustainability into existing methods of valuation, but has noted that existing researches conducted into the relationship between sustainability and real estate have not provided any theory and principle for incorporating sustainability issues into non-market value valuations particularly for non-market industrial properties. The researches concentrated on income yielding residential and commercial properties, and lately, retrofit for owner-occupied properties, whereas sustainability is critical for industries in less developed countries where corporate industrial sustainability is non-existent. The researchers’ methods are all market-based. This study recognises the gap and seeks to bridge it by providing the platform required for valuing industrial properties using a non-market internalisation base for incorporating sustainability.

2.2.1 The conceptual framework

The conceptual specification for a system dynamics for sustainability in real estate valuation for non-market industrial properties is presented in Figure 2.

**Figure 2** Conceptual framework (see online version for colours)

![Conceptual framework](image)

*Source: Adapted from Lektauers et al. (2010) and Luetzendorf and Lorenz (2012)*
The real goal of sustainability is improving the quality of human life by securing economic development, social equity and justice, and environmental protection, while living within the carrying capacity of supporting eco-systems (IUCN/UNEP/WWF, 1991; Cavagnaro and Curiel, 2012). This framework is conceived as a prescriptive support for legislative and other institutional frameworks to engender compliance with sustainability criteria and metrics so that corporate industrial sustainability markets can evolve speedily and index sustainability issues for valuation in Nigeria. The basic thrust is that manufacturing activities cause environmental media pollution that impose health and clean up costs on the whole society, and if external costs exist, the producer may choose to produce more of the products than would be produced if the producer were required to bear all associated environmental costs. By applying a sustainability obsolescence factor to the Owner’s value, the producer either produces less or complies with the metrics. According to Pearse (2005), adequate pricing of externalities will have impact on both people’s behaviour and the improvement of the environment. Prescriptive valuation approach that seeks to internalise costs could be a catalyst for remarkable compliance that would be able to redefine corporate industrial sustainability issues in emerging markets of the future. The Venn diagram in Figure 2 represents the TBL dimensions to sustainability which requires strong human participation in identifying relevant sustainability indicators that are to be presented. Sustainability characteristics would need to be measured against the criteria or metrics to make up a reference sheet. A multi scale model is borrowed from international rating tools of BRE environmental assessment method (BREEAM), Green Star and comprehensive assessment system for built environment efficiency (CASBEE). This framework is expected to provide better understanding to the stakeholders about their roles and expose them to the approaches for integrating sustainability issues into non-market industrial real estates. The principal actors are the stakeholders, the local sustainability rating authority, and the appraiser.

3 The valuation approach

The suggested approach is to assess qualitatively, ‘sustainability obsolescence’ as a depreciation allowance for valuation of non-market industrial properties by scoring in relation to acceptable local sustainability indicators and rating guidelines. Some of the major international sustainability indicators adapted from RICS (2009), Boyd (2005) and Luetzkendorf and Lorenz (2012) and listed in Appendix A.

Qualitative assessment of sustainability issues is in agreement with the RICS Valuation Information Papers No. 13 (2009) and IP 22 (2011) and the submissions of Luetzkendorf and Lorenz (2012). Scoring is adapted from the sustainability rating tools of BREEAM (2011), Green Star (2003) and CASBEE (2004). Ahlroth (2014) agrees with the scoring and weighting method for eliciting judgments on resources, conservation and other environmental issues, but insists that the panel must consist of experts and stakeholders, and that the values and methods are consistent, and transparent.

The valuation process is illustrated in Figure 3.
The main features are

1. an industrial survey (Green Star, 2003) to be conducted by the panel of experts and stakeholders
2. the Delphi technique to be used by the valuer to provide consensus opinion from the panel
3. direct observation, document review of environmental audit report are to be used by the panel members to facilitate scoring (Ahlroth, 2014)
4. scoring is by open consultation and consensus (BREEAM, 2011)
5. weighting max scores/item upon which scoring is to be based (Green Star, 2003)
6. value is to be dependent on final score (CASBEE, 2004).

The Delphi technique will be used to provide consensus opinion at two levels from a group perspective:

Level 1  Selection and ranking of sustainability Indicators relevant to the industry in Nigeria.

Level 2  Scoring of sustainability features/characteristics in relation to criteria.

Consensus or convergence of opinion is established if \( \geq 60\% \) of the panel members give the same response on an item (Stitt-Gohdes and Crews, 2004). Results would be computed using median for each item, and relative importance index (RII). Sustainability Obsolescence would be the aggregate scoring expressed as percentage depreciation for deduction from the cost valuation structure to arrive at a value in use that has reflected sustainability issues.

4  Concluding remarks

The scale of environmental problems is massive and human ability to cope with nature’s reprisal is minimal. It is unrealistic in practice that we rely on rating codes and market-driven approaches alone to enhance sustainability. There is needed to be
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comprehensive in our approach to prevent market failure (Ibiyemi, 2004). Government regulation is necessary as a framework for reducing pollution, but regulators themselves do not have the capacity to achieve societal goals. With a well-designed regulatory structure, and sustainability evaluation framework, civil society and private firms can serve as vigilant extensions of state’s capacity for monitoring and enforcement of sustainability regulations. A situation where there are indirect effects of consumption or production activity on agents other than the originator of such activity which do not work through the price system is unsustainable. In a private competitive economy, equilibria will not be in general Pareto optimal since they will reflect only private (direct) effects and not social (direct plus indirect) effects of economic activity (Laffont, 2008).

Given the above scenario, two research problems can manifest as:

a. The lack of framework for integrating sustainability issues into the valuation of non-market industrial real estates.

b. Industrial investors getting ceiling figure as values to the business through the substitutive cost valuation principle, while the immediate communities are left to bear external costs arising there from.

(a) has a causal effect on (b) and the problem magnifies because the immediate communities get some initial benefits by way of job creation and installation of some facilities, but are greatly burdened by externality pricing not reflected in the estimates of values to the business. Valuation is central to pricing in the property industry, but can also be used to influence those conditions that create necessities for sustainability in the market place or out of it. If existing cost internalisation programmes have succeeded, there would have been considerable reduction in carbon emissions by 2014. The evidence of failure is that carbon emissions are rising (IPCC, 2007). Given the weak response to climate change, there is reason to insist that human society should reduce atmospheric CO₂ and other heat-trapping gases willy-nilly. The dearth of comprehensive mechanisms, according to Lorenz (2006) is one reason why we have failed to control emissions, and the consequences of failure are excessive pollution, and high social cost index (Wheeler, 1992; Amokaye, 2012).

It has been argued that sustainability obsolescence attempts to evaluate and price sustainability in isolation, thus becoming problematic. This is also much true for other forms of obsolescence – physical, economic, and functional (PEFO), for which research has not provided superior substitutes. PEFO do influence valuation input parameters individually and collectively in many ways too, but what to understand is that obsolescence allowance should take account of overlaps in the various compartments in a most coherent manner. Conceptually, obsolescence allowances in property valuations are indicative of the necessity for the property owner/operator to ‘comply’ with certain physical, economic, functional/technological metrics, and in this case ‘sustainability’ metrics. Obsolescence is inevitable as a factor for consideration in most property valuations. The relationship and influence of obsolescence on value may well be appreciated if we consider a building that has reached total obsolescence stage in its life cycle and the value rebus sic stantibus is limited to what can be salvaged and resold, with the prime value on the land element and its development potential. In this brief illustration, obsolescence is the chief factor that has brought the property to the end of its life cycle. Over time, and with sufficient market sensitivity, sustainability obsolescence could play a significant role, among the other forms, in redefining building life and
property income cycles. In the context of this paper, it is unlikely that depreciation for obsolescence could be avoided in a depreciated cost approach to non-market industrial valuations. Doubt has also been expressed as to the likeliness of the approach being adopted by valuation professionals. It may well be submitted that it is too early to predict, besides, we must understand that the issue of sustainability is not only a professional one, but also borders on survival, for which the appraisal profession has a social responsibility.

Real estate professionals should study and interpret market behaviours and gather evidence to show that markets are indexing sustainability issues in rental and capital bids, but the same strategy may not be appropriate for non-market industrial properties where there are no tangible market indices upon which their sustainability can be read, for example, in many less developed countries. The viable solution is to relate their sustainability deficiencies to some acceptable local rating standards from where some quanta of sustainability obsolescence can be derived. Sustainability rating standards play an important role in shaping decisions and choices that industrial process investors would have to make, at least in the long run, hence, it is expected that the investors have to make references to the set criteria from time to time to verify compliance if they wishes to maximise profits, as their production limits would correlate with their degree of compliance with the metrics. Invariably, a kind of action and reaction comparable to those found in the regular markets may evolve, each influencing the other. Arguably, this can be regarded as a substituted market of the prescriptive order. This paper concludes that there is an impact-compliance perspective to sustainability and real estate valuation of non-market industrial properties.

References


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Appendix

Table A1  Major international sustainability indicators

<table>
<thead>
<tr>
<th>Sustainability criteria</th>
<th>Building-related</th>
<th>Location-related</th>
<th>Process-related</th>
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<td></td>
<td>Connection to designated green space, Suitability of original building materials for refurbishment, ecological impacts of materials used for construction, condition of air conditioning plants, availability of appropriate internal circulation, fire safety, space standards, facilities, such as lifts and escalators, enhanced occupant productivity and health, adequate public liability and service provider insurance, quality of communal service areas, aesthetic implications, wheelchair access, awareness and training of emergency evacuation and accident first aid procedures for all floor warden, complementary usage of building (compatible tenants), appropriate training for security and public relations personnel, value of artwork as percentage of the fit out, supportive use and occupation guidelines for tenants, nature of tenant businesses and naming rights, transparency and disclosure of landlord/tenant contracts and marketing agreements.</td>
<td>Quality of overall built environment in relation to aesthetics, visual blending, and wider precinct, public transport availability and standard of service, appropriate signage, proximity to urban spaces, such as town centres and malls, proximity to childcare facilities, recognition of indigenous people through cultural space and communication of site history, preservation of heritage values.</td>
<td>Compliance with health and safety regulation, evidence of alternative energy supplies from renewable sources, absence of indoor pollution nets, use of ODP refrigerants, water consumption (potable, hygiene and cooling towers), fossil fuel energy use, recycling, recovery/reuse and water capture measures, indoor quality measured by ventilation, natural lighting, individual thermal/cooling control, noise abatement, presence of plants that remove air, monitoring of stakeholder concerns, views and provisions pollutants, solid waste disposal technologies, disclosure and transparency of environmental data, regulation compliance, awards, and environmental expenditure of any type hazardous and non-hazardous waste and effluents recycling or removal strategies, savings from reduced energy, water and waste.</td>
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Source: Adapted from RICS (2009), Boyd (2005) and Luetzkendorf and Lorenz (2012)