The Relationship between Sustainability and the Value of Office Buildings

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Abstract:

There is an increasing body of evidence to suggest that the development of sustainability in office buildings and the acceptance of these buildings in the broader property market is increasing. However a gap still remains between the value of sustainability and the value of the building from an International Valuation Standards Committee (IVSC) definition of market value. Current literature is limited in the investigation of the impact of sustainable criteria on value component when undertaking a valuation of a commercial office building. Whilst substantial advances have been made in sustainable design and construction aspects, as well as reducing implementation costs and enhancing benefits associated with sustainability, there appears to be inherent barriers in adopting sustainability in the valuation process for the property industry.

This paper examines the limited previous research into the elements of sustainable criteria that impact upon property value, and in turn should be reflected in traditional valuation methods. The immaturity of the property market for sustainable building is such that current valuation methods do not appear to have significant evidential proof of increased property value through sales or lease evidence for sustainable buildings. Furthermore, this lack of market evidence makes it inherently difficult for valuers to assess the real market value of sustainable buildings through current valuation methodology. In other words, the level of risk associated with incorporating different levels of sustainability into office buildings appears difficult to measure using a market value perspective in today's property market. Accordingly this paper examines current research that has been undertaken to identify particular sustainable criteria that potentially affects the value of a sustainable building. For example, previous research suggests that sustainable criteria impact upon the valuation equation through rental growth, depreciation, risk premium and cash flow. This paper also examines how other studies have viewed the impact of sustainable criteria and how they are weighted within the valuation equation. The discussion provides an insight into the rapidly evolving area of sustainability and office buildings with emphasis placed on the valuation process that seeks to assess a hypothetical purchaser's perspective of this relationship.

Introduction

Sustainable buildings are being heralded as the future for the property industry. Currently the market for sustainable buildings is gaining momentum in the design and construction arena, however the development and investment in these buildings by the private sector is limited. Adequate information and research is unavailable or very limited as to the financial viability and investment in sustainable buildings, and therefore the little research has been conducted into the impact of sustainability on market value in commercial buildings. If the progress and uptake of sustainable buildings is to develop within the property market, it is essential the links between the relationship between value and sustainability is be made for the progress of the investment industry.

Currently in Australia and New Zealand the market for sustainable buildings is being encouraged through government legislation and policy, although the investment by the private sector has been slow to develop due to the lack of evidential proof of the economic viability of sustainable buildings. The lack of market evidence, sales data and lease transactions of sustainable buildings have left many in the industry wondering whether sustainable buildings are feasible (Lutzkendorf and Lorenz, 2005). Current research aims to justify sustainability via demonstrating payback periods or increased value through reduced operating expense or hypothetical adjustments to valuation equations to allow for claimed sustainable benefits, however the lack of evidential proof of these apparent connections between value and sustainability leaves the investment industry wondering and unsure of the financial benefits of sustainability (Madew, 2006). Research undertaken by Lutzkendorf and Sayce, into the valuation methodology of sustainable buildings has developed the concept of the impact of sustainability on value, however this requires further development as the comparison and analysis of sustainability in buildings needs to be standardised.

This research undertakes a literature review and proposes a methodology aimed at identifying the relationship between sustainability and market value. Within this process this paper examines previous overseas research, especially in Europe and the UK, which sought to evaluate the impact of sustainability on value in. It is intended to highlight the current issues of identifying the impact of sustainability upon the value of office buildings, as well as the future direction that research in this area should take.

Background to Sustainable Buildings

In recent years the acknowledgement of our impact upon the earth and consequent effects for the future has become a primary issue in all industries, commonly referred to as 'climate change'. In the property industry this has lead to the development and promotion of sustainable buildings. Sustainable buildings are claimed to reduce the impact upon the environment, although not just during the construction phase but also throughout the life of the building up to and including disposal.

The definition of sustainable buildings is attained through the definition of sustainable development and is continuing to evolve itself. There are a large number of definitions, however the most prominent and universal definition lies in the *Brudtland Report (*1987, p. 43) where environmental sustainable development is defined as "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition was a result of four years of study and debate and provides emphasis upon the need to satisfy human quality of life and the respect for others particularly future generations. Pearce et al., (1989, p.176) further defined sustainability as it "implied using natural resources in a way which does not eliminate or degrade them or otherwise decrease their usefulness to future generations and implies using non-renewable natural resources at a rate slow enough to ensure a high probability of an order

societal transition to new alternatives." The development of the triple bottom line of sustainable development evolved from these definitions, which involved the balancing of environmental protection with social and economic development. In addition, the World Business Council views sustainable development as involving the 'simultaneous pursuit of economic prosperity, environmental quality and social equity' (World Business Council, www.wbcsd.ch 2006).

Extensive research has been undertaken into the environmental and social benefits of sustainable buildings. Sustainable buildings can provide a number of elements that make them more sustainable than their conventional counterparts:

- Reduced production of CO_2, other greenhouse gas emissions
- Reduced water, gas and electricity consumption
- Waste production
- Reduced use of precious natural resources
- Enhanced building occupant health and comfort
- Reduced environmental footprint

Some sustainable buildings achieve all of these points, others only some aspects, although other buildings succeed partly due to the partial or full production of power, water collection and sewage treatment. It is difficult to define exactly what makes a sustainable building, but they could be viewed simply as a building that has a reduced impact upon the environment while providing enhanced user and occupant satisfaction. Extensive research has been undertaken into the lengths to which sustainable building can take from a green building perspective, but rather than conducting an investigation into the wide variety of sustainable buildings that can be developed this paper is aimed at identifying the value of sustainability in a building.

**Sustainability meets market value**

As climate change and the concept of sustainability becomes increasingly more prominent, the need to accurately determine the impact of sustainability on market value is required. Although the trend is towards implementing sustainable principals and initiatives in buildings in the design and construction industry, there is a disconnect between this and the investment and development of sustainable building through the private sector of investors. As there is significant research into the design and construction of sustainable buildings and the subsequent benefits of these buildings, particularly socially and environmentally, there is an apparent 'lack of mechanisms to align environmental and social issues with economic return' (Lutzkendorf and Lorenz, 2005 p.215) The lack of connection between sustainability and economic return affects the main stakeholders who invest in the property market, namely large financial, banking and superannuation vehicles who are the key drivers within the property market. The relationship between sustainability and its impact upon a building's market value is increasingly important to the investment community. Currently there is limited empirical data into sales and lease transactions that involve sustainable buildings, as the market develops, this may change as predicted by various researchers (as referred to by Lutzkendorf and Lorenz, 2005) in this area. However, it is going to take the changing of attitudes of these large investors to bring about a serious change in the property industry.

In the current market, many researchers are using 'The Circle of Blame'(Upstream, http://www.upstreamstrategies.co.uk/ 2006) justify the lack of support and development in the property industry for sustainable buildings – refer to figure 1. The design, procurement and construction side of the industry have access to a variety of tools that assist in the assessment of a building's sustainability. For example, the Greenstar rating system(www.gbca.org.au September 2006) which evaluates a building upon the type of sustainable design features that are scored at varying levels and calculate the star rating for the building. These have generally been developed

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for new buildings, however currently the development of new buildings is less than 3% of all existing building stock in Australia's major cities, Sydney, Melbourne and Brisbane. (JLL 2005) Although there are adapted versions being developed for existing building, these rating tools are attempting to bridge the gap between industry and academia and break the so-called 'circle of blame', and although of sustainability principles and tools have been developed within the property industry, they do not engage the demand side of the industry (Sayce et al., 2003).

Figure 1. Circle of Blame
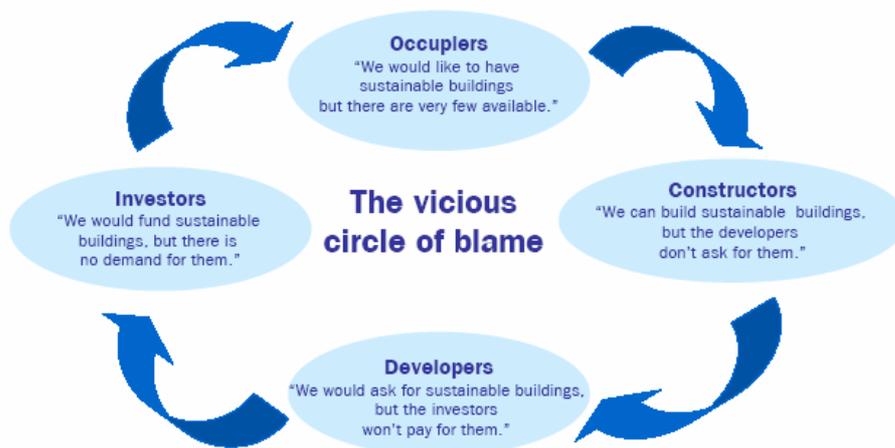
(Source: Upstream, http://www.upstreamstrategies.co.uk/ 2006).

The 'Circle of Blame' is currently used to demonstrate what is happening within the property industry. Researchers like Boyd (2006) and others believe that it is the space occupier who will cause the shift in the industry to develop sustainable buildings. Lutzkendorf and Lorenz(2005)argued the drivers for sustainable buildings will come from the investors. However it appears it will be a combination of factors, including an emphasis coming from investors understanding the financial viability of sustainable buildings from an investment perspective as well as demand from of space occupiers requiring more sustainable space.

In the current market there are a number of space occupiers who would like to occupy more sustainable space, however are not willing to contribute significantly to enable the sustainable space to be developed. However, as seen in the Victorian property market, the policy implemented by the current state government that all new leases require a 4.5 ABGR rating – in turn this will inevitably increase the potential for developers and investors to develop better space. However it is uncertain in an open market situation if space occupiers choose to pay the additional amount or premiums to inhabit those spaces. A survey undertaken by Jones Lang LaSalle in 2005 indicated that overwhelmingly in the current climate tenants would not be willing to pay a premium rental for buildings with sustainable features (JLL, 2006). With occupiers currently not willing to pay a premium for sustainable space, thus sustainable buildings are not claiming higher rentals as claimed by various pieces of research, in particular the RICS Green Value investigation project(RICS, 2006) . Admittedly there are significant differences in the current property markets between the UK and Australia/New Zealand. Research undertaken in Australia and New Zealand has substantial

limitations in accessing reliable and accurate empirical data, which would address the question of whether sustainable buildings are worth more. Also research into the other characteristics or benefits of sustainable buildings as posed by the RICS project of increased rents and prices, reduced tenant churn, reduced operating and maintenance costs and significant improvements in occupier health and productivity has not been undertaken in the Australian or New Zealand industry as yet. In Australia there is research that investigates the reduction of operating costs, and that these can be reduced significantly, however this is resulting in a minimal increase in market value when evaluated via current valuation methods (JLL, 2006).   A study undertaken by Robinson (2005) investigated the increased worth of an office building in the valuation process by questioning what the market *should be pay for the building* rather than what it would actually pay for it. This research also included an additional income factor obtained through reduced employee expenses, like absenteeism and increased productivity. This theory is still yet to be proven, and the way in which this investigation into the increase in a property's worth due to it's sustainability features seems based on a lot of yet unproven assumptions, in particular the social benefits that Robinson (2005) used should realistically be reflected in increased rental premiums paid rather than additional theoretical income added into the equation. Some research on the topic of sustainable value, or green value, has been undertaken however "typically research describe the benefits and tried to illustrate this with some sample sustainable building projects…point(ing) out that sustainable buildings are more cost efficient, effective, profitable and marketable. There has been little representative empirical evidence published to date" (Lutzkendorf and Lorenz, 2005, p.216). That would prove the connection unanimously between market value and the impact of sustainability.

It can be argued that the property industry cannot be reliant upon space occupiers to drive a market as important as sustainability. Increasingly the large investment, banking and superannuation corporation, who are the key drivers in the property industry are seeking to undertake 'triple bottom line' accounting and are endeavouring to be seen as embracing Corporate Social Responsibility (CSR) and taking advantage of corporate sustainability. This was demonstrated by an environmental study of 250 of world's largest organisation, and those that demonstrated a greater respect for the environment were valued at an average of 5% - 10% higher than their competitors (JLL 2004). More recent research into this has been undertaken by Figge and Hahn (2005), by the surveying of 65 European companies and evaluating them using opportunity cost and ratios to determine enhanced value by increased sustainability practices within the company (www.sustainablevalue.com 2006). In Australia the development of serious investors in sustainability is evolving, for example VicSuper invested 10% of their listed equity portfolio in large Australian and international companies rated as having the best sustainable business strategies in their industry sector. (www.vicsuper.com.au 2006) Another Australian example is the Investa Property Group, a property investment company that currently manage $6.2 billion worth of assets over 56 properties across their commercial office and investment portfolio, with 30 of these buildings having sustainable attributes and each achieving a Greenstar rating. Investa are proactive with their goals of reducing energy usage, water consumption, waste reduction and emission production. Investa's proactive sustainable approach to business and property investment and management has been globally recognised by their inclusion into the Dow Jones Corporate Sustainability Index. As the acknowledgement of sustainability has developed within the property industry the company has grown in value on the stock market (www.investa.com.au/InvestorInformation 2006).

Sustainability is gaining significant momentum as in the USA the Dow Jones Corporate Sustainability Group Indices have been developed to track the performance of the top 10% of leading sustainability companies in each industry group in all countries covered by the Dow Jones Global Index. Investors and fund managers also use this index as the basis to select the top performing firms for their sustainable investment funds. The annual review of the components of the Dow Jones Sustainability Index (DJSI) found that since the last review in September 2002 the

DJSI World (in USD) has outperformed the mainstream market, rising 23.1%, compared with 21.2% for the MSCI and 22.7% for the DJ World Index (www.sam-group.com 2006). So why is the property industry still reluctant to see the value in sustainability in their property portfolio? The property sector represents the world's largest industry yet appears reluctant to adopt sustainability. The need for evidential proof, analysis tools and methodologies that identify and prove the impact of sustainability on market value is required. Resulting in the demonstration to all in within the property industry and those also in the investment and banking industries the value of sustainability. Therefore this paper argues that the 'Circle of Blame' theory in figure 1 should be modified to include an additional industry sector not currently included as shown in figure 2..

Figure 2. Modified Circle of Blame
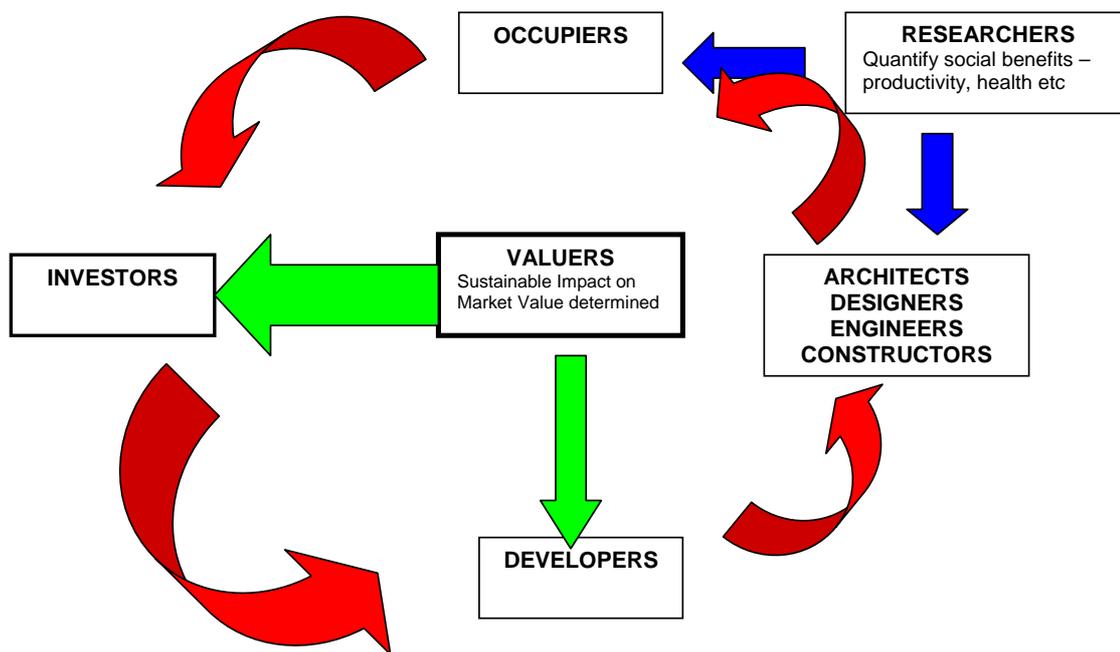
(Source: Author)

Market Value and the valuation process

Investors and occupiers need to know the extent to which sustainability is impacting property worth if they are to respond effectively to sustainability issues (Sayce and Ellison, 2003). This will require an analysis of how market value is determined for commercial office buildings. 'Market value' is defined by the International Valuation Standards Committee (IVSC) as "the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arms' length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion" (IVSC, 2005). Market value can be

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determined through various valuation methods; the most commonly used for office buildings are the capitalisation of income and the discounted cash flow approaches.

Rational investors and developers make decisions in the office property market based on the present worth of future income streams of the office buildings. (Emary, 2005) In Australia, similar to other countries like New Zealand, the emphasis of life cycle costs and long-term impact and running costs of a building are not high on the priority list when developing or investing in office buildings (Robinson, 2005). As Robinson (2005, p.1) stated, "The property and construction industry and its clients tend to focus on short-term gains rather than long-term savings or investment opportunities." Current research suggests there is still an increased cost for sustainable features in a building and possibly more longer term maintenance and management costs which further reduce the potential profit or return on investment for stakeholders, making it inherently difficult to convince stakeholders of the economic benefits of sustainable buildings. Investors and developers, commercially speaking are in this business to maximise the return on capital outlay. However currently in the investment, development or refurbishment of sustainable buildings there is a lack of empirical evidence, appropriate assessment tools and consequently the unknown link between whether a return on the capital outlay for additional sustainable attributes will increase the returns or the value of the building.

In today's current office market, the standard forms of valuing an office buildings is undertaken namely through two traditional methods, either the capitalisation of income or the discounted cash flow approach. A property valuer analyses and interprets current sales and lease transactions and the characteristics of comparable buildings involved against the subject buildings to make accurate assumptions of the current market climate and it's impact upon the value of the subject building. This is where the initial problem lies, the lack of sales and lease transactions for sustainable buildings, worldwide, makes identifying the link between sustainable buildings and it's inherent market value difficult to define. The use of current valuation methodology enables only limited aspects of sustainability to be incorporated, thus not identifying the added value in sustainability. Thus, as Lutzkendorf and Lorenz (2005, p.288) stated in their work into the valuation of sustainable buildings, ' Relying on historical valuation methods will lead to an unbalanced approach for determining a property's exchange price or market value'.

Current promotional research of sustainability tends to assume that the incremental capital expenditure on sustainable attributes increases the market value of the building on a basis of a dollar of capital expenditure another dollar of value. Commonly used for calculating cost value and potentially insurance valuation, the cost approach is used to determine value. The Australian Property Institute (2006) defined the 'cost approach' as 'a set of procedures through which a value indication is derived for the fee simple interest in a property by estimating the current costs to construct a reproduction of, or replacement for, the existing structure plus any profit or incentive; deducting depreciation from the total cost; and adding the estimated land value'. This however is not a current practice when determining the market value of an income producing office building that is treated in the property market as an investment vehicle. In New Zealand, as most likely else where the property market has matured to point where the determination of market value is by the assessment of the present worth of future income streams of the building, rather than by cost considerations (Emary, 1997). In Australia the discounted cash flow technique has been used for some years in determining the market value of office buildings, through the analysis of cash flows of the property over a period of time (Armitage 1997). Registered valuers undertake current valuation practice by the calculation of the present value of future income streams, this influence the emphasis of investment and development decisions. The crucial nature of decisions made in the finance industry requires a standardised methodology for the determination of a property's market value. Traditionally valuation practice in the western world is a combination of the capitalisation of income and discounted cash flow approaches to effectively determine the value of an office

building. However for the determination of market value using the Income Approach requires accurate market data to be obtained to correctly ascertain the market value of a building (Armitage, 1997). In the current market for sustainable office buildings, this empirical evidence is difficult to find, as the maturity of the current market for these buildings is still developing.

The valuation industry uses a number of approaches for evaluating buildings and Armitage (1997) succinctly identifies the five methods of valuation, being:

1. Comparison Approach;
2. Contractor's cost, or summation approach;
3. Residual method or developer's test;
4. Profits method; and
5. Income or investment approach, including direct capitalisation and discounted cash flow analysis.

These valuation approaches are recognised throughout Australia and New Zealand. However to determine the market value of an office building, only the income or investment approach is used in common practice by valuers for an income producing property. The primary methods associated with the Income approach in the valuation of office buildings are the Direct capitalisation of income method and the discounted cash flow method. These require further explanation.

Capitalisation of Income Approach:

This approach is used for office or commercial buildings that typically produces, generates or is capable of an annual income through the leasing of the office space. Typically, as an investor's approach to determining the value of any other investment, one applies a similar knowledge to an income generating property. The capitalisation of income approach is a commonly used method by valuers as a way of estimating the price the property will most likely fetch in the market. (Whipple 1995) This approach is often used dually with the DCF approach, however typically it can be used to value properties when it may not be suitable or appropriate to project incomes, outgoings (opex) or yields beyond current market level. (Armitage 1997) It is typically calculated by

Capital Value (CV) = Net Income (NI) x year's purchase (YP)

Where by:

- CV = is the price that a hypothetical buyer would pay to own the buildings

- NI = the annual rent or annual income generated by the property through rents paid for using the building. Net rent excludes outgoings that incurred while operating the building.
- YP = is a multiplier, which is consequently the inverse of the capitalisation rate. The capitalisation rate is determined or generated by the property's annual net income as a percentage of its capital value derived from the analysis of comparable property transactions. (Armitage, 1997)

This method of calculating value is reliant on market data, particularly as this is actually more of a forecasting tool. (Whipple, 1995) This method of valuation is dependent upon selecting suitable comparable data initial yields obtained in the market to make the correct assumptions when using this technique. It has been argued that "the capitalisation rate reflects the market's perception in regards to the future level of risk associated with the building, where a small change in the level of the capitalisation rate can have a substantial effect on the assessed capital value of the building"

(Wilkinson and Reed, 2006, p 6). In the current market, sustainable buildings have limited market data to make effective comparisons and the market is at a point of immaturity where the market's perception is still cloudy as to the value or value attributed to sustainable buildings. This inherently makes using this standard valuation methodology for determining the value of sustainable building difficult, and until the market matures or significant market evidence eventuates this approach remains inaccurate.

Discounted Cashflow Approach

The discounted cash flow approach is the projection of cash flow expected from an investment (in particular an income producing building) over a particular period of time. The rationale of this method relies on theory that the present value of an investment that an investor has paid to purchase the investment to receive the future net benefits (monetary) obtained in the future (Whipple, 1997). This approach is used in details as the use of cash flow analysis recognises and analyses in details the income and expenses of the investment and in particular the size, sign and timing of the cash flows over the period. (Robinson, 1989)

The discounted cash flow approach is a common investment analysis tool to determine the value of any income producing investment. Property valuers have adapted this theory and model to suit the property industry and the income producing assets of the property market. The DCF enables the present value of an income producing investment over a period of time to be determined. The cash flows over time of the income producing investment are predicted for a particular period, they are then adjusted or discounted for the time value of money over time. When property is analysed, the DCF approach takes into account the major cash flows such as the initial purchase, the income over the time period (often 10 years), any capital expenditures over the time and finally the sale of the asset at the end of the period. These cash flows are then discounted by a discount rate, which allows for the changing value of money over time. Thus calculating the total cash flows over the period to enable a Net Present Value of the asset to be determined. This approach can take into account varying levels of rental growth, inflation, operating expenses, capital expenditure and depreciation to name a few. The depth of this technique is extensive and its application to sustainable buildings is potentially the most appropriate. The approach can take into account the diminished operating expenses, however, the other aspects of sustainability are not currently incorporated into this approach. It has been argued that "they (DCF valuation approaches) take into account rent, renal growth, risk and depreciation, but sustainability is either implicit within the appraisal or ignored.' (Sayce et al., 2003, p.3) It is through this DCF approach that Sayce, attempts in her work to integrate sustainable indicators into the discounted cash flow approach to better evaluate the concept of sustainability in a building and it's possible value.

Through both of these methods the value of a property or building is determined through the investigation and analysis of the net operating income and the capitalisation rate (Wilkinson and Reed, 2006). It was pointed out that "a landlord will focus on potential opportunities to increase the capital value via changing the perception of tenants in the marketplace and the perception of the collective marketplace towards the building" (Reed and Wilkinson, 2006, p. 6). This confirms the current issue of sustainability, the topic of sustainable buildings is still at an early stage and the industry's understanding of sustainability in property is still largely uneducated, therefore before realisation of value in sustainable property can come through to the market, the market need proof, demonstrated through education and example of the financial, environmental and social benefits of sustainable buildings. At this point value should start being perceived in sustainable buildings, but until that time, the valuation process needs to understand the value of the buildings to demonstrate to the market that there is value in sustainable buildings and inherently the opening up of the market's perception toward these buildings through valuation will inherently encourage the development and investment in sustainable buildings.

Investigating the links between sustainability and market value

Sustainable buildings are required to be developed to help reduce the impact upon the environment and its consequent effect on global warming and climate change. However the property industry are somewhat reluctant to take up the challenge of sustainability. Although there is an increasing body of evidence to suggest that the development of sustainability within office buildings and the acceptance of these buildings in the broader property market is growing there is still a gap between the value of sustainability and the value of the building from an IVSC definition of market value perspective. Hindering the investment by the commercial sector to invest in and develop sustainable buildings. The determination of market value, from current valuation methods requires adequate market evidence to establish appropriate rental values, discount rates, rental growth, risk premiums to name a few, to enable the appropriate valuation approaches to be undertaken. However the immaturity of the market for sustainable buildings, in Australia and New Zealand, is such that current valuation methods do not appear to have significant evidential proof of increased property value through sales or lease evidence for sustainable buildings. This lack of market evidence makes it inherently difficult for valuers to assess the real market value of sustainable building through current valuation methodology. There is normally negotiation of rental value between landlord and tenant, and also in the determination of capital value between investors establishes the value of real estate in any market. Typically in any property transaction the physical characteristics of the building do impact upon the negotiation, but it has been argued that the sustainability characteristics of the building do not have any effect upon the rental negotiations or the sale price of a building. (Parnell and Sayce, 1999)

Extensive research has been conducted into the encouragement and justification of the costs of sustainability. Numerous papers, articles and policies have been put forward around the world that states the benefits of sustainability, both environmentally and financially. Lutzkendorf and Lorenz (2005, p 216) observed that research is in abundance on the topic of sustainability, however the justification and linking of sustainability to the economic side of the equation is limited and they argued that "Typically, researchers describe the benefits and tried to illustrate this with some sample sustainable building projects". With various research undertaken globally, attempting to point out financial benefits of sustainability, and that they potentially increase the value of the property through:
- Reduced operating costs;
- Lower annual operating costs through more efficient asset management;
- Further cost savings made through the sustainable building;
- Increased occupant productivity and well being, less absenteeism and less staff churn;
- Marketing advantage;
- Increased market value for asset;
- Increased rents; and
- Higher relative investment returns.

Current literature is limited in the investigation of the impact of sustainable criteria on value in the valuation of commercial office buildings and historical evidence of sales and lease transactions are limited making it inherently difficult to evaluate the impact of sustainability in the property market (Boyd 2006). Whilst substantial advances have been made in sustainable design and construction aspects, as well as reducing implementation costs and enhancing benefits associated with sustainability, there are inherent barriers in adopting sustainability in the valuation process for the property industry. It was argued "development will not be sustainable if the economic constraints under which the property development process operates are not considered" (Robinson, 2005, p.1). The necessity to be able to clearly identify the impact of sustainability on a building's market value

is clearly obvious, as without the proof the development of sustainable buildings will be severely diminished.

In order to determine how sustainability impacts upon a buildings' value, the connection between what aspects of sustainability could impact upon a building's value. This needs to be done through the determination of what sustainable attributes; indicators and performance indicators have a relationship with impacting upon a building's value. Property is inherently in itself a complex asset class, when adding the complexity of sustainability into the equation, both in definition and it's effective implementation in buildings it makes it inherently difficult to determine the best way of effectively valuing such a complex asset while taking into account all the complexities of not just the asset but sustainable attributes and their impact into the equation as well. Although not investigating the relationship between value and sustainability, an earlier study identified and developed a means of weighting the importance of sustainability attributes through the use of hierarchical modelling, delphi analysis and multi-criteria analysis (Hemphill et al., 2002). The method of determining the importance of the sustainable attributes resulted in transport and mobility (22.1%), economy and work (21.5%), community benefits (20%), resource use (17.5%) and buildings and land use (18.9%). Although using various methods for analysis, the determination of weighting would possibly be different when applied to buildings. However the findings in both of these surveys and statistical analysis would vary in type and weighting were it to be replicated in Australia and New Zealand, as priorities are seemingly different. For example Australia's lack of water, higher significance and weighting would be placed on this if the survey was conducted in Australia, whereas in New Zealand, their abundance of water lessens the significance and weighting of that particular attribute. This makes it inherently more difficult to create a standardised valuation model that analyses the impact of sustainability on market value, because market perception of sustainability and the key areas is different depending on various economic, social, geographical and environmental differences. However, the work undertaken by Hemphill et al., (2002) is of significant importance of particular aspects of sustainability, the challenge is now to understand the effect of sustainability on property assets and their market value.

Sayce and Ellison (2003) through a major collaborative research project '*Integrating Social Responsibility Policy into Property Investment Practice*' investigate ways in which sustainability factors can be factored into the property appraisal process. Through a series of surveys of market representative, they produced a number of papers identifying a number of sustainable attributes that affect value. Their work was developed through a major collaboration of academe and industry in determining the particular attributes affected value. After these indicators were identified they were ranked based on importance and channelled the weighting through the value determinants rental growth, depreciation, risk premium and cash flow. This project focused more on existing commercial buildings rather than new buildings as the majority of commercial building stock is existing, with less than 3% of existing stock being added as new each year (JLL 2005). Sustainable buildings can be viewed as a property with a range of characteristics, "all of which contribute to it impact on the triple bottom line: environmental, social and economic benefit" (Sayce and Ellison, 2003, p.1). The aim of the project was to develop a system that would enable a valuer to assess a building's sustainability profile and accommodate this within the valuation equation. Eight major criteria were identified as the characteristics that a building might impact on the economy, society and the environment. Sustainable indicators would be characterised into the elected criteria to allow the measurement of the building performance under these headings, resulting in the assessment of building sustainability. These criteria determined would be:

- Building flexibility;
- Energy efficiency;
- Transport;
- Pollutants;
- Location;

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- Occupier;
- Ecology; and
- Design (Sayce and Ellison, 2003i, p.11).

A series of indicators, which include all levels of the impact of sustainability, from embodied CO2, operational CO_2 emissions, water consumption, waste management, to name a few. These indicators were then categorised into the most relevant criteria and assessed for the type of impact, being environmental, social or economic or any of these combined. Once categorised these indicators were analysed to determine whether they impacted upon property worth through CSR, corporate image or as a potential cost and whether these impact on the investor, occupier or both. The list, which started out quite extensive, was slowly diminished as the particular elements were identified as impacting upon the worth of the building. Sayce then further evaluated what part of the valuation equation these sustainability factors or characteristics impacted upon as shown in table 1.

Table 1. Links between Sustainability Criteria and Worth

Sustainability Factor	Conduit
Building Adaptability	Risk premium, cash flow, rental growth, depreciation
Accessibility	Rental growth, depreciation
Building Quality	Rental growth, cash flow, depreciation
Energy Efficiency	Rental growth, risk premium, cash flow, depreciation
Pollutants	Rental growth, risk premium, cash flow, depreciation
Contextual Fit	Rental growth
Waste and Water	Rental growth, cash flow, depreciation
Occupier Satisfaction	Risk premium
Occupier Impact	Risk Premium

(Source: Sayce et al., 2004)

As expected the impact upon value would be markedly different between these sustainability factors. Therefore a weighting system was used in the survey/workshop where by investment based participant ranked the criteria in terms of the significance to worth and the occupiers ranked in terms of real estate decision making (Sayce et al., 2004). Resulting in the Sustainability Criteria Weighting are shown in table 2.

Table 2. Links between Sustainability Criteria and Weighting

Sustainability Criteria	Weighting
Accessibility	1
Building quality	0.9
Adaptability	0.8
Occupier satisfaction	0.7
Pollutants	0.6
Contextual Fit	0.5
Energy efficiency	0.4
Waste and Water	0.3
Occupier Impact	0.2

(Source: Sayce et al., 2004)

Sayce et al., (2004) developed a working model that was based on the calculation of worth (DCF model) integrating the sustainability factors; this was tested upon a pilot study of four different commercial buildings. These commercial buildings were all existing buildings with no additional specialised sustainability attributes added to them, these buildings were as they were and they included: a shopping centre, a provincial office building, a retail warehouse park and a provincial high street retail premises.

The impact of sustainability on market value is still unknown, as the extent or level of sustainability cannot be accurately measured nor compared. Another issue is when valuing a building with sustainable attributes; the valuation of the building will be undertaken on the level of design of the sustainable criteria. This raises the issue of buildings not performing to how they were designed. An issue that is getting significant research undertaken in Australia presently. A building, for example that has been designed and built attaining a 5 star rating, however the performance of the building during operation doesn't attain the levels of sustainability it was designed to do. As Lutzkendorf and Lorenz (2005) explicitly stated that a building designed with strong emphasis on sustainability issues may not reach its targets because of poor operation and management. If governments do not impose sustainable legislation or policy of sorts to encourage the private sector to invest in sustainability, the development will be significantly stunted, unless the private sector can be convinced of the financial viability of sustainability. To convince the private sector, they need to be able to understand the market value of their asset and what the impact of sustainability has upon its value. In this way, the development of sustainability and its inherent value is regarded as a real asset and benefit to the building rather than an non-economic add on, that has a lot of research and publicity but no hard facts as to the fiancial benefits to the bottom line of investment.

In their research, Lutzkendorf and Lorenz (2005) have developed the theory of sustainable buildings and it's various meanings in industry currently. Through this analysis of the meaning of sustainable buildings in table 3 is similar to table 2, Lutzkendorf and Lorenz (2005) have created a table of requirements that classify sustainable buildings, however this list is significantly different to table 2.

Table 3. Relationship between Requirement Classification and Effect

Requirement Classification	Effect
Minimisation of life cycle costs/ cost effectiveness from a full financial cost-return perspective	Economic, environmental and social aspects
Reduction of land use and use of hard surfaces	Economic, environmental and social aspects
Reduction of raw material / resource depletion	Economic, environmental and social aspects
Closing of material flows	Economic, environmental and social aspects
Avoidance / reduction of hazardous substances	Economic, environmental and social aspects
Reduction of CO_2 emissions and other pollutants	Economic, environmental and social aspects
Reduction of impacts on the environment	Economic, environmental and social aspects
Protection of health and comfort of building occupants / users as well as of neighbours	Economic, environmental and social aspects
Preservation of building's cultural value	Economic, environmental and social aspects
Maximisation of the buildings functionality	Aspects related to the fulfilment of users and occupants needs
Maximisation of the building serviceability	Aspects related to the fulfilment of users and occupants needs

(Source: Lutzkendorf and Lorenz, 2005)

Table 3 rationalises the ability to classify a sustainable building, but it does not effectively enable the determination of the level of sustainability and its subsequent impact upon social, environmental and economic factors. The findings from Lutzkendorf and Lorenz (2005) about the current situation regarding sustainable buildings is that a potential purchaser is considering buying a sustainable building depending on whether they are purchasing it as an investment asset or to occupy the building will make a difference in the assessment of the property's worth. As Lutzkendorf and Lorenz (2005) argued that an investor's view of worth can be described as the discounted value of the cash flows generated by the property whereas the owner – occupier regards the property as a factor of production. In contrast, the owner-occupiers' view of worth depends on the property's contribution to the profits of the business and on subjective issues such as image, identity and other personal preferences. However, both groups will also be mindful of the property's potential resale price to a purchaser from the other group (Lutzkendorf and Lorenz 2005).

Lutzkendorf and Lorenz (2005) created a table of possible sustainability key performance indictors, which are divided into criteria of Object, Environmental, Social and Economic performance as shown in table 4. Although not listed, the indicators that can be analysed in the design stage and then more importantly the indicators for the assessment of existing buildings.

Table 4. Object, Environmental, Social and Economic Performance

Criteria		Indicators for the assessment of existing buildings
Object Performance	Technical	Realised heat insulation class, sound insulation class and fire safety class and load carrying capacity Ease of conducting maintenance, servicing, and recycling activities
	Functional	Functionality and serviceability Adaptability and responsiveness Suitability for remaining service life Accessibility
Environmental Performance	Energy Use	Primary energy demand during occupation (measured)
	Raw material depletion	Use of fossil fuels
	Land use	Current degree of sealing of the lot Current land use per unit (workstation)
	Impacts on Environment	Global warming potential Ozone depletion potential Acidfication potential Eutrophication potential Photo-oxidant formation potential
	Waste Production	Waste production during occupation and use Total waste accumulation
	Soil and Ground water	Impacts on soil and ground water of lot
Economic Performance	Life Cycle Costs	Costs for refurbishment and modification Effective maintenance and operating costs Projected disposal costs
	Development of income and value	Income stream/ current market value /current calculation of worth
Social Performance	Health of occupants / users	Appearance of Sick Building Syndromes Appearance of Black mould
	Comfort and well-being of occupants/ users	Occupant user satisfaction
	Safety	Number of building related accidents
	Indoor air quality	Concentration of selected substances (TVOC, radon)
	Comfort and well being of neighbours	Disturbance through building use and occupation
	Cultural value	Existing monumental protection

(Source: Lutzkendorf and Lorenz, 2005)

These criteria and indicators when input into a system of building related information will allow the integrated assessment of the building. The extensiveness of this list needs to be rationalised into a minimal list of indicators, and a degree of quality and amount to enable comparability of different assessment approaches needs to be determined and agreed upon within the industry. It was proposed that elements of LCA (Life Cycle Analysis) are required to focus on the building rather than on cost or environmental performance. It is important to emphasise that the formation and use of the assessment scheme will only prove meaningful if benchmarks and appropriate weights for indicators can be assigned. This is important not only for the assessment of a building's environmental performance but also for the determination of a building's market value. The problems inherent already is the comment, that benchmarks and appropriate weightings is required, this requires high levels of market data to be gathered and evaluated, and currently the ability to

collate such data is limited, but there is more data and research available in this area than currently in the empirical financial data of sales and lease transactions in the property market.

Hedonic pricing method is often associated with attempting to estimate economic values for ecosystems or environmental services and house prices. The hedonic pricing model allows for the characteristics, in this case of a building, with a variety of sustainable attributes. Therefore hedonic pricing suggest that the value of the individual attributes of the building will be determined by the price buyers are willing to pay for it changes when the attributes change. The advantages of this methodology are that the value is based on actual market choices and market perception. However, the issue of data, particularly the volumes required for this type of analysis, does just not exist in the current property market for sustainable buildings. This method is also quite complex and would require a high level of statistical expertise, time, accessibility to data and would probably not easy for the valuation profession to develop and consequently include in their valuation process due to lack of facilities and skills. (http://www.ecosystemvaluation.org 2006)

The view taken by another author, closer to home is Boyd, who believes unlike Lutzkendorf and Lorenz that traditional valuation methodology is capable of assessing the impact of sustainability on financial performance and that advanced methods are not required to replace the traditional methods already used in practice today. (Boyd 2006) As Boyd correctly comments 'when reasonable market data on the impact of environmental and social factors is available, which is not the case at present, the advance methods may supplement the traditional method, but they are unlikely to replace it.' (p 3) Boyd's research differs from that of Sayce and Lutzkendorf, by trying to compare the elemental difference of including a triple bottom line approach to traditional investment valuation methodology. Unlike Sayce and Ellison, Boyd relies on existing research in Australia, the Green Star rating system, as the basis for selected sustainability criteria in his research. Boyd's research also incorporate not just economic and environmental consideration but lists a number of social benchmarks required.

Discussion

Essentially Lutzkendorf and Lorenz (2005) challenged the appropriateness of traditional valuation methodology in the deciphering of the impact of sustainability on market value, where it was argued there. has been limited development of aligning environmental and social considerations with economic return in property. Consequently the situation in the industry still stands that the investment in and development of sustainable buildings is limited and the consequent property transaction are limited through the 'Circle of Blame' theory with an emphasis that the lack of regarding economic issues as part of sustainable buildings rather than an afterthought of environmental and social considerations. The development of analysis and valuation tools to better assess sustainable buildings will encourage the uptake of sustainability through the international finance and banking industries, who importantly are the key drivers of this industry as they are better able to assess the value of and the impact and financial future of sustainable buildings. Once the knowledge within the industry is developed and analytical and practical tools are available to assess the impact of sustainability on market value in buildings, the take up by the private sector may increase significantly since they would be presented with proof of the economic and financial advantages of sustainable buildings.

Assessing the value of a sustainable building needs to be undertaken over the entire life cycle, although currently the valuation methodology using a DCF approach usually reflects the building over a period of only 10 years. The life span of a building would inherently be difficult to determine, and from an investor point of view – thus, *who would own and invest in a building for that amount of time (i.e. only 10 years)*? Even the common payback and life cycle span currently suggested in literature seems to be a minimum of 25 years. In today's market, how practical is it of

an investment vehicle to invest in a building for 25 years, certainly some assets would be held for that long, but the common trend is to hold an asset for a period of time and then sell and invest in another, this generally is not a 25 year turn around but can vary between 2 and 15.

Boyd makes a comment in his paper, that the authors agree with in response to the work undertaken by Sayce, whereby the value of existing building was decreased when sustainability was adapted into the valuation methodology as previously described. Boyd states '…the rent currently being paid relates to the existing level of sustainability of the building. If the building had a higher level of sustainability the rental level may be higher. Therefore it could arguably be suggested that the "less sustainable" building is correctly valued by the market and that a "more sustainable" building would have a higher value.' (Boyd, 2006, p 9) Although Boyd does not undertake to investigate the impact of sustainability on market value, rather he looks at the incorporation of triple bottom line theories into investment valuation. Boyd finds through this methodology that sustainability features will not negatively impact upon a property's performance and more likely will have a positive influence. Robinson (2005) who also undertook an investment valuation approach to evaluate the impact of sustainability on property value also deemed that sustainability increased the net residual value of the property. However, Robinson acknowledges that more research is required into the impact of psychic income, rental values, technical performance and occupant productivity and health. In Robinson's analysis, accounts for some interesting assumptions, in particular the addition of extra income made through improved productivity and reduced absenteeism. This is still as yet unproven, research is being undertaken currently into the dynamics of that claim, however if such a significant difference was determined, it should be justified through the rent paid by the space occupier rather than additional income. In contrast Boyd's conclusion he rationalises issues that have appeared in the studies examined so far, in particular the key performance indictors – their identification and quantification, and the measurement of these key performance indicators and the measurement of the impact upon the value through the cash flow analysis (Boyd, 2006). Even though these analyses look at investment valuation, as Lutzkendorf and Lorenz comment, these are hypothetical analyses that try to emphasise the benefits and are illustrated with a sample sustainable project. The development of tools to effectively determine the impact of sustainability on value is going to need to involve more than singular examples of buildings, it's going to need numerous examples to quantify the effects of sustainability on a building's market value. Boyd (2006) produced a model that effectively paints a current picture of how sustainability impacts upon a buildings' value from an overall point of view of investment value as shown in figure 3.

Figure 3. Value Impact of Environmentally Efficient Buildings
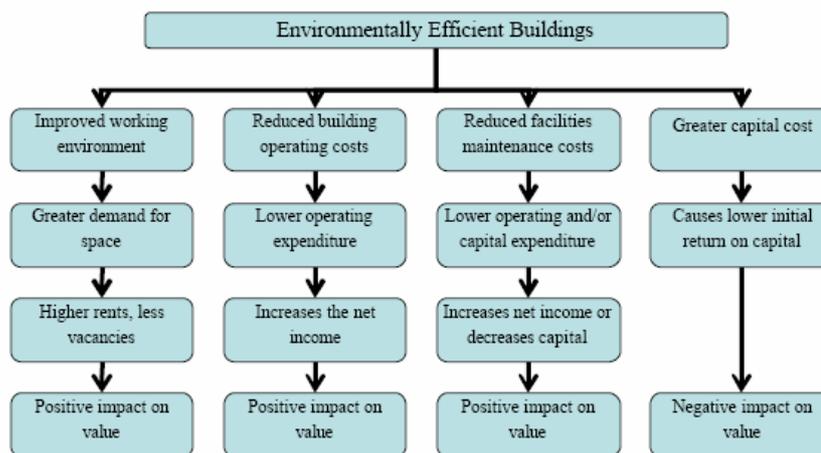
(Source: Boyd, 2006)

As set out in this paper, there a number of methodologies identified that are attempting to identify the relationship of the impact of sustainability on building's market value. However none are 100% reliable and able to accurately measure the impact of sustainability on market value. Clearly there needs to be more research undertaken to determine the impact of sustainability on market value. The evolution of valuation methodologies is required to be able to understand this relationship, however the current research still fails to identify the impact of sustainability on market value.

Directions for Further Research

There are many areas for further research when examining sustainability and office buildings. Additional research needs to be conducted into the relationship between value and sustainability in office buildings in the local markets of Australia and New Zealand. This is supported by the maturity of property markets, lack of comparable and benchmark data, and the impact of local elements of resources, climate, generation of resource and production of gases and waste. From a valuer's perspective sustainable attributes need to be measurable and comparable, to be able to fully considered whether determining if a building is actually sustainable. Furthermore, there is also a need for a standardisation across at least Australia and New Zealand of a list of sustainable attributes that impact on value, and the influence that should be given in the valuation equation. Particular emphasis should be on the need to understand whether the sustainable building, works in both theory and practically. This will inherently be difficult valuing a potential building off the plan, or development wise, however it is necessary for value to be attributed to sustainable attributes that the value is placed where it is actually deserved. The problematic issue of many high performance sustainable buildings currently existing in the Australian and New Zealand markets is that they are not performing to the standard in which they were originally designed, especially with reference to sustainable features. Another area that requires monitoring and analysis, is the collection of empirical data, as time passes, potentially transaction are being made, and to enable the property industry to seriously understand the nature of sustainability's impact on market value, detailed and reliable empirical data needs to be collated and analysed over a period of time.

Conclusion

The impact of sustainability on market value in buildings is a rapidly emerging area where more research need to undertaken. This paper concludes that although research is being undertaken into the developments of methods on how to evaluate the impact of sustainability on a building's market value, a consensus has not yet reached a point where the impact can be accurately measured and quantified. This is mainly due to the lack of market data, empirical data of market transactions like sales and lease details of sustainable buildings. Some research has discovered that there is a potential impact upon market value due to a building's sustainable attributes, but so far research has failed to evaluate the impact upon a buildings' market value. However the measurement of the impact of sustainability is still questionable, it also goes further to suggest what aspects of sustainability will impact upon the property's market value.

This paper has reviewed the current research undertaken in this field. Sayce and Ellison (2004) provided an in-depth analysis into the industries point of view of what sustainable criteria impact upon a property's market value. Although weighting the criteria in terms of importance and it's apparent affect on the key valuation variables of cash flow, depreciation, rental growth and risk premium, they used a pilot study to demonstrate the effectiveness of their work. This resulted in a devaluation of existing stock, which industry would not be very accepting of a method that devalues the entire current building stock. The other issue with this approach is the measurability of how they identify the sustainable elements in the building and the subsequent performance of those elements in the building. On the other hand Lutzkendorf and Lorenz (2005) argued that to determine the impact of sustainability on the market value of a building would require more advanced valuation techniques than the standard methodology of DCF. They proposed the using hedonic pricing to enable the determination of what characteristics in the building affect it's market value. However the inherent problem is currently there is a lack of empirical evidence on the sustainable property market, which makes this approach currently impossible to undertake. In the future it may be an excellent tool to develop as it should ascertain the different aspects of sustainability that impacts most upon the market value of a property.

Sustainable buildings are being heralded as the future for the property industry but due the lack of market information and empirical data the impact of building's market value is unknown. Currently the market for sustainable buildings is gaining momentum in the design and construction area, however the development and investment in these buildings by the private sector as the investment community are unsure of the effects on value of sustainability. Appropriate information and research is required to be undertaken, with the need for analytical tools for property professionals and investors to use to determine the value of sustainability. There is evidence to argue there is a connection between value and sustainability in office buildings, however further research needs to be undertaken to fully determine the impact of sustainability on valuation elements and subsequent the overall value of the property.

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