The possible use of LCC & LCA for commercial property valuations
- Putting a value on 'green' buildings

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Paper presented at the CIB World Building Congress, Toronto, Canada, 2004

ABSTRACT

The valuation of real estate is an essential tenet for all businesses but recent changes in the perception of real estate indicate that traditional valuation methods are not sufficient to meet the market participants' demand because they fail to assess the value of the property to the user of the asset. It is argued that particular building characteristics and associated performance, especially in the case of so called 'green' buildings are major determinants of worth and value that new ways of assessing a building's worth and value have therefore to be developed. This paper aims to explore the rationale for the consideration of environmental and social issues in property valuation theory and practice and highlights the importance of the combined use of Life Cycle Costing (LCC) and Life Cycle Assessment (LCA) for the application and further development of advanced and more sophisticated property valuation methods. Furthermore, it is explained how current developments within the banking industry stress the significance for the assessment of environmental and social risk associated with real estate and why the combination of LCC and LCA is an essential prerequisite to adequately base real estate investment and lending decision on environmental and social considerations. It is argued that the combination of LCC and LCA opens up the possibility to dramatically improve property valuation and risk assessment of real estate in general and to solve the problems associated with the valuation of green buildings by providing the methodological framework for the description of different building characteristics and associated environmental, social and cost performance. However, it is pointed out that before LCC and LCA can fully develop their beneficial potential the whole environmental and building related research community must strive towards standardisation of terminology and towards more exchange of ideas between financial and environmental research disciplines and reach more robustness of assessment approaches and greater reliability of assessment results.

1. INTRODUCTION

There is a trend within the international real estate and construction industry to thoroughly and holistically regard buildings over their entire life cycle and to implement the principles of sustainable development. Two issues related to implementation of principles are: (1), the provision of life-cycle related information on energy and mass flows and their resulting effects on the environment and on financial expenditure; and (2), how to combine ecological and economical questions and how to equally and simultaneously regard their results for decision making processes (e.g. real estate investments, strategic portfolio decisions, maintenance strategy, etc.). In recent years considerable progress has been made in the development of various methods and tools describing and assessing the ecological quality and performance of buildings; however to date, the demand for results of ecological assessments in the form of eco-labels and building certificates is limited to a small group of individuals and some companies which regard social responsible and environmental friendly investments as an element of their corporate identity. The major part of the international investment, finance and banking industry (the key driver behind the real estate industry) is not yet fully aware of the general value and importance of a sustainable point of viewand in particular, of environmental friendly and social responsible buildings (referred to as 'green' buildings in the text) There are, though, some hints that this may change:

- Within the scope of the United Nations Environment Programme (UNEP) 192 members of the financial services industry (e.g. Citigroup, Barclays Group, HSBC, Lloyds, UBS, Credit Suisse, Deutsche Bank, etc.) issued the Statement by Financial Institutions on the Environment & Sustainable Development.[1] In this self commitment they state: "We recognize that identifying and quantifying environmental risks should be part of the normal process of risk assessment and management, both in domestic and international operations." (Paragraph 2.3) and "We encourage the financial services sector to develop products and services which will promote environmental protection." (Paragraph 2.7)
- Also within the scope of UNEP 86 members of the insurance industry (e.g. AXA Group, Gerling, HSB Group, NPI, R&V, Dominion of Canada General Insurance Company, etc.) issued a similar Statement of Environmental Commitment[2] in which they state: "We will reinforce the attention given to environmental risks in our core activities. These activities include risk management, loss prevention, product design, claims handling and asset management." (Paragraph 2.1) and "We support insurance products and services that

[1] See http://unepfi.net/fii/english.htm
[2] See http://unepfi.net/iii/statemen.htm

promote sound environmental practice through measures such as loss prevention and contract terms and conditions. (Paragraph 2.5)

- In June 2003 some of the worlds biggest banks (ABN AMRO, Barclays, Citigroup, HSBC Group, Rabobank, etc.) signed an agreement to adopt the World Bank's so called 'Equator Principles', a framework for banks to manage environmental and social issues in project financing.[3] The banks agreed to provide credit only to projects that are neither environmentally nor socially harmful and for which the borrower has completed an extensive environmental assessment.
- Two recent surveys on Socially Responsible Investment (SRI), one conducted by the UK Social Investment Forum and the other one by Deloitte & Touche reveal high expectations for significant SRI growth in Europe.[4] Deloitte & Touche (2002) concluded that there is a clear message for listed companies: "Investors see value in a robust approach to corporate social responsibility."
- Recently, services have been developed that allow investors and costumers to know more about the behaviour of companies. For example, the Ethical Investment Research Service (ERIS) can be used to examine a company's attitude and performance across a wide range of environmental, social and ethical issues.[5]

The developments described above highlight the widespread concerns over environmental, social and ethical issues that put pressure on companies and investors to behave in a more responsible manner with respect to the communities they affect and operate within – both for current and future generations (McNamara 2002). Consequently, the market for building projects with an emphasis on environmental and social issues will expand. However, the business world is not an altruistic one, willing to pay for green building projects without any knowledge about the building's performance and added value. Property fund managers, decision makers as well as private and institutional investors need to have information about the property's contribution to business profit. This paper aims to explore the rationale for the consideration of environmental and social issues in property valuation theory and practice, and to show obstacles that may arise by doing so. Furthermore, the importance of Life Cycle Costing (LCC) and Life Cycle Assessment (LCA) for the application and further development of advanced valuation methods is highlighted. Finally, an explanation is

[3] See http://www.equator-principles.com/index.html
[4] http://www.sri-adviser.com/article.mpl?sfArticleId=1183 and http://www.deloitte.com/dtt/cda/doc/content/sociallyresponsible(1).pdf
[5] See http://www.eiris.org/

provided of how current developments in the banking industry stress the significance of assessing environmental risk associated with real estate.

2. PROPERTY VALUATION

The basic goal of any property valuation is to issue a well-founded prognosis of a property's selling price for a hypothetical real estate transaction on a particular date; or expressed in other words, to ascribe a value to a building without knowing if the free market would accept this estimate. However, this describes property valuation only in its simplest form.

To give a more precise insight into the fundamentals of property valuation the distinction between price, value and worth is crucial: Price is the amount asked, offered or paid for a good or service, and it is important to bear in mind that the price paid for goods or services by an individual with particular motivations or special interests "may or may not have any relation to the value which might be ascribed to the goods or services by others" (IVSC 2003). Therefore, the terms price and value are not synonymous, although they are frequently used as if they were. Value is an economic concept referring to the monetary relationship between goods and services available for purchase and those who buy and sell them. "The economic concept of value reflects a market's view of the benefits that accrue to one who owns the goods or services as of the effective date of valuation" (IVSC 2003). Most property valuation methods are designed to determine a property's Market Value, which is defined in International Valuation Standards 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 arm's-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently, and without compulsion.

The first step in the determination of Market Value is to estimate the highest and best use or the most probable use of the property; then valuation methods and procedures have to be applied which reflect the nature of the property and the circumstances under which the given property would most likely trade in the open market (Assimakopoulus et al. 2003). In order to conduct the valuation it is pivotal to have market evidence (i.e. transaction data) and/or to have insight into the calculations of worth of the different market participants. The term worth is used to describe the inherent worth of the property to the individual or group of individuals. For example, if the potential purchaser has investment or occupation on mind the view of the two groups of bidders will be different. 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.

Consequently, the owner-occupier's view of worth depends on the property's contribution to the profits of the business and on subjective issues such as image 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. Assimakopoulus et al. (2003) point out that valuation professionals with insufficient access to transaction data (which is the case in many property markets) can only attempt to replicate these calculations of worth in arriving at an estimate of exchange price, i.e. Market Value. This is because any observed price from a comparable sale is not indicative of Market Value because real estate trades in a relatively inefficient market and prices resulting from particular transactions depend on the perceptions of worth and the negotiating strengths of the buyer and seller (Fisher 2002). Thus it appears that property valuation should always take into account any changes in the market's participants view of the benefits associated with the ownership of real estate. If the market participants see additional benefits in the ownership of environmental and social friendly buildings valuation professionals have to regard this circumstance when they try to estimate a property's Market Value. However, this is not easy due to the following reasons:

- It is very difficult to empirically prove the benefits of green buildings due to the lack of detailed information on different building characteristics and associated performance. However, those benefits obviously exist and they are well documented and described in literature. For example, Wilson et al. (1998), Heerwagen (2000), Yates (2001) and Lützkendorf and Bachofner (2002) point out that sustainable buildings are more cost efficient, effective, profitable and marketable. Only a few studies exist on these issues but some evidence from an American study: Nevin and Watson (1998) found that Market Values of residential homes increases US$ 20 for every US$ 1 decrease in annual utility cost and that cost-effective energy efficiency investments do appear to be reflected in residential housing Market Values.
- It can be assumed that certain building characteristics and features contribute positively to the value of the property. However, it is very difficult to isolate the effects of these factors on property values.
- Transaction data or rent levels of green buildings are a scarce source due to the mere fact that research activities on this issue have just started yet.
- It is difficult to define with certainty what an environmental friendly and social responsible building is and which indicators and measures are a sign of good performance.
- Traditional property valuation methods are not (yet) suitable in regard to a building's performance to meet environmental or social requirements.

To provide a feeling for the problems that may arise when trying to address these issues in valuation reports, the following examples are given: (1) What adjustments have to be made to rental growth estimates for an office building with high thermal and acoustic comfort and with high quality of the indoor-air indicating higher productivity and reduced absenteeism of workforce? (2) What risk premiums are appropriate for fully air-conditioned offices if one regards increasing energy costs and the risk of power outages as seen in New York in August 2003? (3) What level of risk for vacancy reductions are appropriate for offices with low energy consumption during occupation indicating lower operating costs for potential tenants? (4) Is it necessary to adjust discount rates in order to reflect a higher stability of cash flows due to improved marketability of green buildings? The list is endless and leads to further questions (McNamara 2002); for example to what extent are any of these issues addressed in current property valuations? Does this mean that property is presently mis-priced and to what extent? According to McNamara (2002) these questions can be summed up as a general assessment of the business case for Socially Responsible Investment in property.

In order to solve this valuation problem the authors suggest that the following three steps are necessary which are explained in more detail in the subsequent sections:

1. Before it is possible to draw any conclusions from the effects of building characteristics and performance on property values it is necessary to combine LCA and LCC and to create a suitable system of performance indicators and measures that integrate environmental, social and cost considerations.

2. Further research needs to be done in order to obtain market evidence and to gain deeper insights into occupants' and market participants' demands. Then advanced valuation methods have to be applied in order to analyse the value and importance of single building features and to correlate environmental, object and social performance with investment performance.

3. The results can then be used to modify and to extend traditional valuation methods.

3. THE COMBINED USE OF LIFE CYCLE COSTING (LCC) AND LIFE CYCLE ASSESSMENT (LCA)

The terms Life Cycle Assessment and Life Cycle Costing (sometimes referred to as Whole Life Costing) are often used interchangeably, which creates a great deal of confusion. The concepts of LCA and LCC within the construction and real estate industry have developed separately from each other in response to either economic or environmental issues.

LCC was originally developed in the mid-1960s to assist the US Department of Defence in the procurement of military equipment (Cole and Sterner 2000). Today the application of LCC is much more widespread and encompasses all those techniques that take into account both initial costs and future costs and benefits (savings) of an investment over a certain period of time (e.g. the lifetime of a building). These techniques systematically consider all relevant costs and revenues associated with the acquisition and ownership of an asset and they are used to facilitate the effective choice between different project or building alternatives; e.g. to asses which design and construction technology choices have the greatest influence over the life cycle of a building, and by focusing on these areas, to evaluate if and how significant improvements can be made (Kishk and Al-Hajj 1999). LCC calculations usually consist of the following elements: (1) initial capital cost for design and construction or acquisition; (2) management and operating costs; (3) costs for maintenance and renovation, and; (4) the costs incurred or benefited from the building's disposal. With LCC-techniques it is possible to demonstrate the benefits of energy efficient design because these buildings require less or smaller plant and equipment to service them and they also consume fewer resources for their construction. But there are also several limitations or problems associated with LCC techniques, which have to be understood in order to interpret the results. For example, it is very difficult to estimate future maintenance and operation costs and it takes a lot of experience and observations to determine the life of building materials and components. Furthermore, very few individuals or businesses pay all the costs of the acquisition and ownership of a building and they therefore regard some cost more important than others. Additionally, there is an ongoing discussion about the appropriate form of representation of LCC results in dependence of its application (e.g. capital value for general comparison, investment plans for the scheduling of payment flows, etc.). But despite existing problems the well founded prognosis of life cycle costs is indispensable for the purpose of investment decisions and its significance is further increasing with the rise and growing prevalence of BOT-models (built – operate – transfer). At the moment examples for computer aided prognosis of life cycle costs exist in The Netherlands (Kostenreferentiemodel), in Norway (Arskostnadsanalyse) and in Finland (Kiiteistötieto).

However, investment appraisal using cost data is relatively straightforward compared to appraisal and comparison on the basis of environmental information due to the wide range of data available, and imprecise and diverging perceptions of good environmental performance (Edwards et al. 2000). LCA has been developed as a result of a more responsible attitude towards the environment. "LCA methodologies have emerged as a means to profile the environmental performance of materials, components and buildings through time and have been generally accepted within the environmental research community as the only legitimate basis to compare competing alternatives" (Cole and Sterner 2000 p. 368). Usually LCA examines energy and mass flows in order to provide information on resource consumption and to determine the origin of harmful environmental loads which have potential effects on global warming, acidification, ozone depletion, biodiversity, eco-toxicity, human toxicity and on occupational and living health. Although enormous research activities have been carried out and various environmental assessment methods and tools have emerged worldwide (e.g. LEED (USA), BREEAM (UK), Eco-Quantum (NL), Okoprofil (NOR), etc.) there remains a significant absence of standardisation in terms of scope, definition of performance indicators and weighting of different environmental aspects (Todd et al. 2001).

In theory the combination of LCA and LCC approaches can be regarded as highly beneficial because it would help to find a good balance between cost and environmental issues and would support the eradication of the commonly held misbelief that 'green' buildings cost more in terms of capital cost. But to date, the combination of LCC and LCA approaches is hampered by some methodological problems. Among others, these are:

- LCC techniques do not consider the process of making the product; they are only concerned with cost whereas LCA considers production. In monetary or LCC considerations the building materials used are regarded within the cost of the building and are no longer distinguishable as single building elements.
- Life cycle costs are usually discounted to present value over time, whereas environmental impacts are not. Consequently, whilst costs decrease progressively over time environmental loads and effects remain just as potent (Bartlett and Howard 2000).

But despite the contrasting reasons to develop and to conduct LCA and LCC techniques they have something in common. The key similarity is that both utilise data on

- the quantities of materials used,
- the service life the materials could or will be used for,

- the maintenance and operational implications of using the products and on
- the end of life proportions to recycling (and re-sale value) and disposal (Edwards et al. 2000).

Those common fundamentals form an appropriate basis for the development of complex tools that allow a combined determination and assessment of cost, energy, environmental and social issues along the life cycle of buildings already within the planning phase. First examples of combined tools are LEGOE/LEGEP (Germany) and OGIP (Switzerland). The basic goal of these combined assessment approaches is to allow professionals to appreciate a design or building solution simultaneously from different points of view and within different life-cycle scenarios. A detailed description of approaches for an 'integrated life cycle analyses' is provided by Kohler and Lützkendorf (2002). One major problem, however, associated with combined or integrated assessment approaches is the definition of appropriate indicators and measures of building performance. The following table is neither complete nor exhaustive but gives a general overview on possible building performance indicators:

Table 1: *Building performance indicators*

Object-performance	Cost-performance	Environmental-performance	Social-performance
- Functionality - Adaptability - Longevity/Durability - Stability - Availability - Mechanical resistance - Safety in case of fire - Noise protection - Insulation	- Non-construction cost (site or asset purchase, fees, etc.) - Construction cost - Operation cost - Maintenance cost - Replacement cost - Disposal cost	- Energy consumption - Resource depletion - Environmental impacts - Indoor air quality	- Occupants health and well being - Thermal comfort - Acoustic comfort - Visual comfort - Safety in use

At the moment two obstacles in the assessment and description of building performance exist: First, there is an ongoing debate about the most appropriate performance indicators and standardisation activities (ISO TC59 SC 17) as well as global forums like the Green Building Challenge deal with this issue but agreement is not reached yet. Second, and this is disregarded in nearly all current assessment approaches, the time frame of validity and usefulness of these performance indicators must be defined along the life-cycle of the building; i.e. different indicators for different phases of the building's life-cycle. It is crucial to define if the assessment is done either for a planned building in its design phase or for an already existing building in its operating phase. The assessment results for planned buildings are normally based on calculations, assumptions and scenarios whereas

existing buildings can be assessed on the basis of measured and current consumption values supplemented by a post-occupancy evaluation. The assessment should indicate if it is based on an analysis of past measurements ('retrospective evaluation'), on current data ('snap-shot evaluation') or on a well-founded prognosis of future developments ('anticipatory evaluation').

However, if these hurdles are taken, the combination of LCC and LCA opens up the possibility to improve property valuation in general and to solve the problems associated with the valuation of green buildings by providing the methodological framework for the description of different building characteristics and associated environmental, social and cost performance for property valuation purposes. This is because the sound description of building characteristics and the knowledge about the effects of particular design solutions are essential elements of those advanced property valuation methods that are explained in the following section.

4. THE VALUATION OF 'GREEN' BUILDINGS

Current property valuation methods can be grouped into traditional and advanced ones. The traditional valuation methods include the comparable, investment, profits, residual and cost methods. All these methods rely on comparison as the principal tool of analysis. Although the most common method for valuing income producing real estate is called the 'investment method' it is in fact a method of simple comparison. And comparison can only be relied upon if there is a degree of uniformity in the market.

French and Wiseman (2003) have argued that the traditional reliance of valuers to use methods of comparison to determine a property's Market Value has led to an artificial divergence of a property's worth or 'value in use' and its Market Value or 'value in exchange'. This is because comparison is becoming more difficult due to both the diversity of letting or lease contracts and the variety of different building qualities offered in the market place. However, in an efficient market (e.g. the stock market) exchange prices are determined by the buyer's perception of worth, i.e. price and worth should coincide. Assuming that building occupiers are becoming increasingly aware of the worth of the space they occupy (which affects their view of what they are willing to pay) indicates that the use of traditional methods of comparison that do not attempt to analyse the worth of the property investment from first principles leads to an incorrect approach for determining a property's exchange price or Market Value. In other words, "the valuation profession has forgotten how to determine the 'worth' of a property from the viewpoint of the user" (French and Wiseman 2003, p. 25).

Valuers need to apply valuation methods that try to analyse the market or attempt to determine value by understanding and imitating the thought processes of the market's participants. This is possible by using the so called advanced valuation methods consisting of artificial neural networks, hedonic pricing methods, spatial analysis, fuzzy logic, autoregressive integrated moving average and rough set theory. A more detailed description of those valuation methods is given in Curry et al. 2002; Amato 2002 and Assimakopoulus et al. 2003. The most suitable and promising methods to address the issue of the valuation of green buildings seem to be hedonic pricing methods and artificial neural networks which are currently used to explain the formation of house and land price levels. Kauko (2003a) gives some examples of their application.

The theory of hedonic price functions provides a framework for the analysis of price formation of differentiated products like housing units, office buildings, etc., whose individual features or quantitative and qualitative characteristics do not have observable market prices. It is assumed that the different quality characteristics have particular relationships to the price of the product that are defined in a hypothesised formal model. The analysis is conducted by using multiple regression techniques on large data sets whereby the basic idea is to compare different products and to assess the value of their differences, so called 'shadow prices', with respect to all the factors determining the price (Kauko 2003b). The aim is to measure (using objective data) the value market participants place on these different quantitative and qualitative characteristics. However, the dilemma is that one often does not know what an appropriate formal model is. The procedure is then to choose another model, perform the analysis and study the results; provided the results do not give cause to disprove of the model, appear reasonable and logical, and are in agreement with accepted beliefs, the model is then regarded as appropriate (Janssen et al. 2001).

An extension to hedonic pricing methods is the artificial neural network approach that is applied because of its greater flexibility and because of potential non-linearities in the hedonic functions. Neural networks are artificial intelligence models which have been designed to replicate the human brain's learning processes; in order to use a neural network to estimate property values it must first be trained with a set of real estate data (transaction prices or rent levels and data on the associated building characteristics) from the same market. Neural networks consist of three basic components: the input data layer (information on different building characteristics), the hidden layer(s) and the output layer (the estimated property value).The hidden layer(s) contain two processes: the weighted summation functions and the weighted transformation functions (Assimakopoulus et al. 2003). Both of these functions relate the values from the input data to the output measures (the estimated

property values). The weights in the functions determine the strength of the impulses between the layers, i.e. they provide information about the importance of different building characteristics. The training of the neural network leads to an adjustment of the weights until the observed output values and the values estimated by the network are at the minimum. Compared to hedonic price methods the neural network approach has certain advantages: An *a priori* specified formal model is not required and particular relationships between price and building characteristics do not have to be assumed. When using hedonic price methods the predictions are exact due to the selected formal model and strict assumptions, however the predictions may not be the correct ones. When using more flexible artificial neural networks the results are not exact, but a broad variation is allowed. However, the neural network approach is plagued by a certain lack of transparency, i.e. it is unclear how to explain the computations behind the results ('black box problem') because there is no straightforward functional relationship between input and output values. Consequently, neural network approaches provide *a posteriori* support for a certain loosely formulated theory (Kauko 2003a).

Both methods have pros and cons but the results of their combined application provide estimates of the value and importance of different property features. However, both methods require large sets of real estate data in order to produce valuable results. This is one of the reasons why the relevance of large property databases will increase dramatically in the future. In the case of green buildings further research needs to be done and information on transaction data and rent levels must be gathered. To date, only one major research project in these areas is known and which is run by Sarah Sayce, Kingston University (UK) and Louise Ellison, Portsmouth University (UK) in conjunction with a consortium of UK commercial property industry representatives and the Royal Institution of Chartered Surveyors.[6]

Furthermore, both methods are based on clear descriptions of building characteristics. But as previously mentioned, no commonly accepted terminology and system of indicators exists. Consequently, the restrictions resulting from a lack of data and from the lack of standardisation have to be removed before hedonic pricing and neural network approaches can be fully develop and their potential for improving property valuation results realised.

It could be argued that even if adequate real estate data and a sound system of building indicators would be available to conduct analyses based on the methods described above, the results will, in theory, probably only affect property valuation. This is because the majority of valuers probably

[6] See: http://www.kingston.ac.uk/press/press_archive/2003/apr/sustainability.htm

will not have the facilities and required skills to use advanced techniques and that they therefore will likely rely on traditional valuation approaches for the foreseeable future. Indeed, this is problematic because the traditional methods are not suitable to address the issues raised above. For example, the most widespread valuation method is the investment method which uses yield as the unit of comparison. The basic approach for determining Market Value for a property let at its full rental value is simply rent divided by yield. One of the main failings of this traditional method is that all risks and chances associated with the property, including rental growth potential, obsolescence and the risk of loosing the tenant, etc. are implied within the so called All Risks Yield (ARY). Furthermore, the basis for deriving the ARY is dubious, adjustments to the ARY are insufficiently analytical and the mathematics of the approaches can be seen to be suspect. Therefore, attempting to address even more risks and chances within the ARY that stem from the issue of sustainability cannot be regarded as an appropriate solution. For this reason a 'sustainability factor' should be developed as an add-on to the traditional valuation methods. This could be done by using the results of the application of advanced valuation methods which offer a scientific basis for the price or value adjustments that have to be made and do not rely on the knowledge, judgement and experience (or inexperience) of the individual valuer.

5. RECENT DEVELOPMENTS WITHIN THE BANKING INDUSTRY AND REAL ESTATE RISK ASSESSMENT

In April 2003 the Basel Committee on Banking Supervision published the third consultative paper of the New Basel Capital Accord (often referred to as 'Basel II') that contains new capital adequacy rules for international banks. On first glance, capital adequacy in international banking may have nothing in common with sustainability and green buildings. However, these capital adequacy rules (which are applied by nearly all banks worldwide) determine how much capital a bank must hold against their loans. At the moment the minimal capital requirement is 8 %; i.e. the maximum amount of loans banks can issue is 12.5 times their capital. Under the new rules of the Basel II Accord, loans are categorized into different risk-classes and depending on the risk class the capital requirement is either lower, equal or above 8 %. Consequently, interest rates will behave analogically: The riskier the loan the higher the interest rate. In order to determine the degree of risk or the so-called probability of default of loans, the Basel Committee on Banking

Supervision has created a classification system for real estate and project financing.[7] Unfortunately, the Basel Committee on Banking Supervision regards loans secured by real estate assets and real estate project financing very risky. In the worst case banks have to hold 6.25 times more capital for financing a commercial real estate project than they have to hold at the moment. This is probably not a major problem in the Anglo-American countries where capital market financing is more common. But German property developers and real estate professionals are buzzing with excitement because real estate in Germany is mainly financed by banks and therefore interest rates are expected to rise dramatically.

To avoid this unfavourable treatment of commercial real estate, the Basel II Accord contains an option that allows banks to determine the riskiness of real estate projects (and herewith capital requirements) by themselves. The prerequisite, however, is that the bank has developed a so called real estate rating system which has to be approved by the national banking supervisory authorities. A real estate rating system is based on a large data pool containing information about the bank's past real estate loans and on a system of different rating criteria to classify real estate features and characteristics as well as local externalities and market conditions. The idea is to draw conclusions from the performance or default rates of past real estate loans on the probability of default of current and future loans. But due to the following reasons there exists no real estate rating system at the moment which produces valid and traceable results: the economic unit 'real estate' is incredibly complex and research activities and studies exploring the reasons for default of loans secured by real estate are either inadequate or unavailable. Furthermore there is a lack of suitable data and a complete absence of standardisation concerning the weighting and assortment of rating criteria. Nonetheless, many major banks are currently trying to develop their own rating systems and this offers the opportunity to foster sustainable development among real estate projects of every type and scale: As banks are becoming more aware of the risks (and chances) associated with environmental and social issues it is likely that they will be willing to integrate environmental and social performance criteria within their real estate rating systems. This, in turn, would add one more benefit to investments in green buildings, i.e. interest incentives.

Initial evidence of this comes from The European Group of Valuers Associations (TEGoVA), an organisation primarily concerned with the development of property valuation standards and with

[7] The classification system can be found on page 183 ff. of this document: http://www.bis.org/bcbs/cp3annex.pdf (Note: The authors regard this classification system to be imperfect and not yet fully developed because it does not regard the quality of the building adequately. For this reason a proposal on the extension and modification of the classification system has been written which can be downloaded from the Basel Committee's website: http://www.bis.org/bcbs/cp3/univkarl.pdf)

the education of valuation professionals but with close affiliation to the European mortgage industry. TEGoVA proposed a property and market rating system not only for capital requirement purposes but also because they regard clear chances and risk profiles of properties and markets as a central element of property valuations and economic feasibility studies. TEGoVA's rating system includes the rating criterion 'sustainability'.[8]

However, sustainability is not defined nor explained in any way. If one looks at other rating systems currently being developed by other organisations or banks[9] similar problems regarding rating criteria concerning building quality exist: there is a lack of precise definitions, of common terminology and of understanding what good environmental and social building performance might be. For this reason there needs to be proactive participation in this process by building engineers and the whole environmental research community. The aim must be to offer one sound and understandable system of building performance indicators ready for implementation within those rating systems described above. No time has to be wasted because the Basel II Accord will be put into practice by the end of 2006 and a great chance of pushing sustainable development within the real estate industry could be missed if real estate rating systems would be developed without regarding environmental and social issues adequately.

6. CONCLUSION AND OUTLOOK

The perception of real estate is changing. Market participants are becoming more aware of the benefits and risks associated with the ownership of real estate. This affects the way real estate will be treated for valuation, lending and other decision making purposes and means a great challenge for the development of appropriate methodological approaches and supporting decision tools. (It seems that the IT-branch is not yet fully aware of this potential market)

It has been shown that traditional property valuation methods are insufficient to meet current and future requirements. Therefore, two advanced valuation and assessment methods (hedonic pricing and neural networks) have been shortly introduced which better reflect the market participants' thought processes and which appear to have the potential to improve the quality of valuation and assessment results dramatically. It has also been shown that using the results and methodological framework of LCC and LCA is an essential prerequisite to adequately assess the value of the

[8] See: http://www.tegova.org/evs2003GNX.html

[9] For example rating systems are being developed by FERI and TÜV Süddeutschland as well as by HVB Expertise GmbH

property to the occupier as well as the risks and chances associated with particular building characteristics. The following figure summarized the use of LCC and LCA for real estate investment and lending purposes:

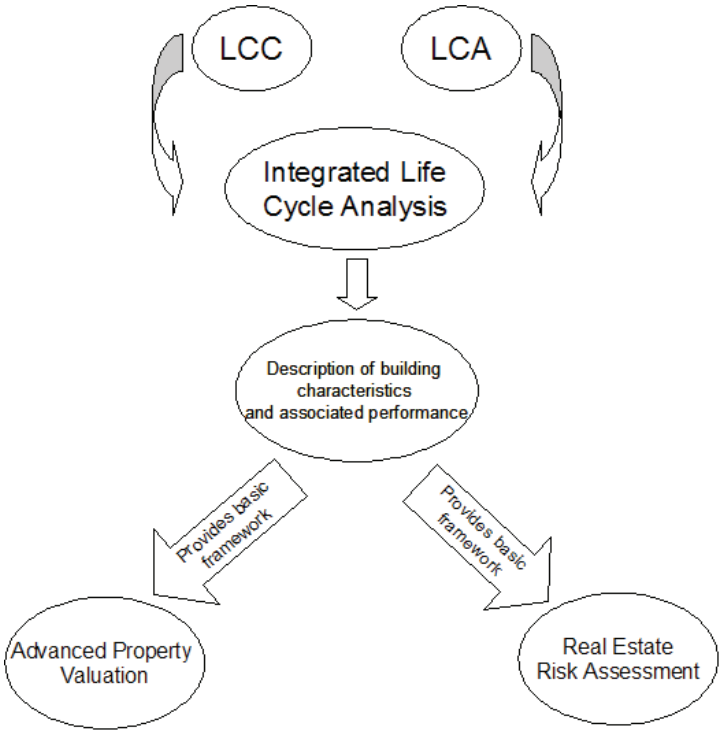

Figure 1: *The use of LCC and LCA for real estate investment and lending purposes*

But before valid results can be produced and before real estate investment and lending decisions can be adequately based on environmental and social considerations, two issues need to be addressed:

- First, the entire environmental and building related research community must strive towards standardisation of terminology and towards more exchange of ideas between financial and environmental research disciplines. Especially regarding the combination of LCA and LCC there needs to be further development in order to reach more robustness of assessment approaches and greater reliability of assessment results in order to meet the requirements of the financial and banking industry.
- Second, great emphasis has to be placed on the creation of new and on the extension of existing property databases and indices in order to obtain more market evidence for the performance of green buildings. Existing empirical studies on the performance of green

buildings either focus on cost performance or on energy consumption. However, what is required is information on the overall building performance including rent levels and transaction prices.

Finally, the knowledge about the effects of different design and building solutions on cost, social and environmental performance combined with the results of advanced valuation methods offers the possibility to determine the key success factors of real estate. This in turn will provide those real estate professionals and advisors with a significant competitive advantage given that they will be able to advise their clients on that basis.

Additionally, the developments described above will most definitely affect assignments and business activities of architects and engineers whose major duty at the moment is to deliver design and planning solutions. In the future, clients will possibly have to be informed about the influence of these design and planning solutions on overall building performance. Furthermore, architects and engineers need to provide their clients with building related information that is relevant for valuation and rating purposes. Moreover, there will be a demand for real estate professionals with a new combination of knowledge and experience, i.e. real estate economics combined with technical experience and knowledge about environmental and social interrelations. However, a somewhat complex course of study does not exist at the moment and challenges universities and educational institutions.

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