Greenfield Shopping centre development. The integration among environmental features, building design and investment analysis at the decision making stage.

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Structured Abstract:

Shopping centre is a long term investments in which Greenfield development decisions are often taken based on risks analysis regarding construction costs, location, competition, market and an "expected" DCF. Furthermore, integration among the building design, project planning, operating costs and investment analysis is not entirely considered by the investor at the decision making stage. The absence of such information tends to produce certain negative impacts on the future running costs and annual maintenance of the building, especially on the energy demand and other occupancy expenses paid by the tenants to the landlord. From the investor´s point of view, this blind spot in strategy development will possibly decrease their profit margin as changes in the occupancy expenses have a direct outcome on the profit margin.

In order to try to reduce some higher operating cost components such as energy use and other utility savings as well as their CO2 emissions, quite a few income properties worldwide have some type of environmental label such as BREEAM and LEED. The drawback identified in this labelling is that usually the investments required to get an ecolabel are high and the investor finds no direct evidence that it increases Market Values. However there is research on certified commercial properties (especially offices) that shows better performance in terms of occupancy rate and rental cost (see Warren-Myers, 2012 for a detailed discussion). Additionally, Sayce (2011) says that the certification only provides a quick reference point i.e. the lack of a certificate does not indicate that a building is not sustainable or efficient.

Based on the issues described above, the research compares important components of the development stages such as investments costs, concept/ strategy development as well as the current investor's income and property value. The subjects for this analysis are a shopping centre designed with passive cooling/ bioclimatic strategies measured at the decision making stage, a certified regional shopping centre and a non-certified standard regional shopping centre. Moreover, the proposal intends to provide decision makers with some tools for linking up green design features to the investment analysis in order to optimize the decision making process when looking into costs savings and design quality.

Keywords: shopping centre investment, green building, real estate development, passive strategies design, decision making

Article Classification: Real estate development

1. INTRODUCTION

Although the shopping centre is an American phenomenon, it has been perhaps the most successful real estate, land use and retail business concept worldwide on the 20th century. The industry development and its expansion overseas have transformed shopping habits, retail distribution system, urban structures as well as the land value surrounding the building (see White & Gray, 1996; Beyard & O' Mara, 1999). The modern centre is not only a retail space but also one of the most important community option for leisure activities and a gathering place. It is a complex commercial establishment comprising a wide range of tenant mix among which there are daily services, heath care and entertainment such as restaurants, movie theatres and children's play area. The mixed arrangement works in conjunction with an attractive, comfortable spatial definition in order to enhance the shopping experience for those visiting the centre and also to inspire their decisions. This is one way which developers and owners have been using to keep their centres competitive and to attract increasingly more consumers as well as marketing and selling merchandise, since the growing popularity of online shopping has been influencing traditional retailing.

According to Kramer et al. (2008), digital retailing and new costumer behaviour have forced the industry to explorer a new form of retail environment in which shopping spaces are more integrated and more oriented to costumers' choices. Consequently, the centre is designed with greater flexibility for future changes and increase in uses and functions in line with retail market perspectives. From the investor's point of view, the centre now is a dynamic business as it is continually changing. Their strategies also entail linking up a series of socioeconomic, financial and design decisions, which should be taken at the early development stages.

Carrying the above issue further, the centre can be considered a restricted commercial property investment. It is a long term investment in buildings seldom able to change their use as their design features are particular to this sort of business. Moreover, development decisions are taken based on low-risk scenarios. As well as integration of building characteristics, expansion planning, operation and maintenance should be considered so that the building is capable of absorbing strategies changes. That is to say, this full analysis works in conjunction with the economic circumstances to guarantee an adequate revenue flow that makes sure the shopping centre is financially successful.

Furthermore, the shopping centre development process operates a sequence of events, some of which overlap or repeat at different stages. Planning the centre moves beyond the conceptual stage once the investment feasibility is determined by the quantification of future expectations. This process is infinitely flexible and few activities follow a predictable sequence. In addition, developers' subjective experience drives the decision making instead of prescribed analysis or research on the field. Rational project planning is not advanced and this circumstance emphasises a lack of systematic reflection (see FISHER et al. 1997, KOHLHEPP, 2012).

According to Kohlhepp (2012), the conceptual models used to describe the real property development lead to confusion, frustration, duplicity and extraordinary risk-taking as developers have a dissimilar understanding of the nature of the development process. Furthermore, the integration of the development events is not completely considered at the decision making stage. The absence of such information tends to produce certain negative impacts on the future running costs and annual maintenance of the building, especially on the energy demand and other occupancy expenses paid by the tenants to the landlord. From the investor´s point of view, this blind spot in strategy development can potentially decrease their profit margin as changes in the occupancy expenses have a direct influence on profit margin.

In order to explain the real estate process and to develop management and decision support models of practical use, many academic researchers have concentrated on development process arrangement providing a framework of activities although it has slight empirical evidence due to the lack of professional uses. However, much is written concerning the development stages but quite little in view of the importance of their integration in making decisions. Anther topic of note is that software for real property development is

underdeveloped and developers merely deal with financial appraisal packages used to analyze the expected cash flow provided as although it gives insufficient information to assist them at decisions or risk management.

In parallel with the issue above, since the sustainability aspect has become prominent in the real property sector, many researchers have been focusing on connecting environmental aspects to commercial property development and valuation. However, developing and assessing a green building is not yet an exact science. According to Sayce (2013), as there is no one sustainable building definition and the stakeholders have different perception about this concept. Creating value from these criteria is a complex and subjective activity that requires valuers and investors to have a deep understanding and to keep abreast of developments in the area. In order to achieve a sustainable identity, developers and owners worldwide are increasingly seeking to certify their buildings using some type of environmental label e.g. BREEAM and LEED. However, the certification only provides a quick reference point i.e. the lack of a certificate does not indicate that a building is not sustainable or efficient.

In addition, the drawback identified in this labelling in commercial properties is that usually the investments required to get a sustainable certificate are high and the investor finds no direct evidence that it increases Market Value. As the objective of an investment is to maximise their return on capital based on economic theory, raising the use of sustainable criteria in commercial property development is limited due to the lack of financial justification and empirical evidence. However, there is research on certified commercial properties (especially offices) that shows better performance in terms of occupancy rate and rental cost although specifically on shopping centre investment there is very little research which clearly proves that it is possible to obtain a better certificate rating with relatively low financial investment (see Jesus et al 2010; Warren-Myers, 2012 for more detail).

Looking into the connection between development process and sustainability, although some criteria can decrease running costs, construction costs, maintenance and depreciation of the building, the shopping centre´s conceptual designers frequently dismiss the integration among environmental and building performance. Furthermore, many investors and developers worldwide suppose that sustainable building is primarily featured by restricted parameters such as energy demand and waste of water. Topics such as human health and well being, protecting the natural environment and resources as well as recycling materials are usually not considered in decision-making. According to Kohlhepp (2012), green building techniques and sustainable development are best understood in the building life cycle context instead of at the construction stage. However, today the most important analysis of the sustainable nature of a development is purely made at the public approval stage prior to the construction stage.

The aim of this paper is to understand, from a practical perspective, how environmental and sustainable features are capable of interfering in the central development decisions considering the changes in the sector. Moreover, the proposal intends to provide decision makers with some tools for linking green design features to the investment analysis in order to optimize the decision making process when looking into costs savings and design quality. To achieve these goals, the study compares important components of the development stages in which the building's physical quality interferes in the decision-making.

The subjects for this analysis are three Brazilian shopping centres with different design aspects and owned by International level companies. Although the centre business model is International (see White & Gray, 1996), some circumstance alter in each case due to local marketability to delimit the research, the Brazilian market was chosen for two main factors: [i] in the last years the sector has been showing a large number of Greenfield development as a result of higher company capitalization caused by the offer of shares in the stock market as well as foreign companies investments in the domestic market; [ii] according to ICSC data, although the Brazilian market presents an enormous number of gross leasable area (GLA), when comparing the total Brazilian GLA per inhabitant to USA, UK and Canada in which the sector is more developed, the Brazilian market shows a high potential for new developments.

In the next section, previous research on the real property development process and Building sustainable features is presented and their relationship to the shopping centre development is discussed. After that, the case study with the results is presented, followed by the discussion, conclusions and recommendations.

2. THE DEVELOPMENT PROCESS

In summary, a real estate development process is a sequence of linked activities, in which the first stage is the business opportunity identification and the last is the occupation of the building by the users after the construction is complete (see WYATT, 1997; FISHER et al, 2008; KOHLHEPP, 2012 for more details). Although this field is a significant economic output component for many countries, it should be noted that there is still very little research and literature worldwide and what there is is focused on discussing one by one the development events individually such as project feasibility, planning and design, as well as building operation but not providing sufficient information about their integration and sequence in making decisions. Furthermore, usually subjective experience drives the decision making and the process management due to the lack of a planning methodology and a systematic reflexion that provides an entirely view of the development.

According to Graaskamp (1981), the process involves different personalities, interest groups, as well as limited resources, i.e. it is a complex business with constant interaction of three main groups – consumers, stakeholders, and public infrastructures such as offsite services and facilities; hence, the developer requires a holistic framework that provides an in-depth examination of risks and opportunities at the investment analysis decision stage, as well as potentially avoiding time and cost failures at the management process stage. The process is a larger system that encompasses a considerable number of stakeholders to achieve long term objectives, thus it is not only important to understand working processes but as well to be concisions of the factors that influencing the firm strategies and the process in itself (see LUNDGREN, 2010; KOHLHEPP, 2012, for more details).

Moreover, it is important to highlight that the shopping centre is a dynamic business as the design is often changed in order to make the stores spaces suitable for tenants' needs. Therefore, it is essential that developers should understand development stage integration in order to measure its impact on time and costs and quantify these modifications in the investment analysis as well.

Regarding the process stages, according to Kohlhepp (2012), most texts divided the real estate development process into four broad steps: site acquisition, obtain necessary approvals, building construction, lease-up and operation of the building. On the other hand, Wyatt (xxxx) states that the process has five stages: opportunity – feasibility – design – production – occupation, as well as the fact that it is cyclical in that redevelopment takes place through the real estate asset depreciation.

However, with the current urban growth pattern, which deals with land recycling and Greenfield land development, in order to reflect a long term view of the process, Kohlhepp (2012) highlights the necessity to expand the models with three more stages: [i] The Land package stage, in which a land planning firm improves the value of the land through conceptual land planning, zoning changes and environmental study before selling the land to the land developer; [ii] The land development stage in which the land developer builds roads, utilities, recreational amenities as well as the land subdivision; [iii] The renovation stage where the depreciated property is remodelled and then repositioned in the market. Currently, many shopping centres developers

Looking into Greenfield shopping centre development, understanding the activities included in the Land package and land development stages is essential when the business analysis embarks on the acquisition of a site for which the master plan is still under development. The new urbanization and its features such as approvals time, zoning, mixed uses and site occupation, impact directly on the investors' strategies and also on the Shopping Centre Market Positioning and Expansion.

2.1. The development stages

Step 1 – site selection
According to Wilkson et al. (2008), the development starts when either a parcel of land or a site is considered suitable for the proposed use, or if the demand for a particular use leads to a search for a suitable site i.e. the development idea comes from an early study of a site or metropolitan areas where a possible demand or need for the real estate use is identified. This market analysis encompasses demographic, socioeconomic, financial and merchandising information, which helps the developer to identify an opportunity or potential planning according to their entrepreneurial vision.

The land choice for the development of any type of centre should involve the analysis of important features such as: trade area distance, location for target markets, easy access, high visibility and proper size, shape and topography for the centre proposed and its parking. The site should also be located in an area with a potential population and economic growth. Furthermore, Kramer (2008) highlights that the optimal location is vital to the success of the centre and the absence of any of these factors will possibly negatively impact the business feasibility.

Step 2 – project feasibility
This stage is considered one of the most important phases of the development process. It is divided into important analysis, which provides key information for the developer to take the decision to invest in the project or not. In other words, the viability analysis explores in depth four main issues: 1. market research; 2. site physical features and zoning, 3. legal investigations; 4. the financial appraisal of the centre.

The first issue, Market analysis, could be considered the backbone of the project's feasibility as it deals with the identification and study of demand and supply for the proposal. It provides the input for analysing retail opportunities and selecting target markets, improves the initial business concept and also stimulates development ideas (KRAMER, 2008). Furthermore, it supplies the developer with trade economic information that aids them in determining the minimum rents and the tenant mix of the centre and also to avoiding market risks. Therefore, a comprehensive market study for retail encompasses: geographic delineation of the trade areas, population characteristics, competitive retail characteristics (such as annual sales and tenant mix), as well as recommend characteristics for the centre such as size, tenant mix and anchors. It is important to note that, the conceptual design of the centre, interior characteristics and spatial dimensions is mainly driven by the market research (see White & Gray, 1996; Beyard & O' Mara, 1999; KRAMER, 2008 for more details).

The feasibility analysis of the land includes analysis of location and physical features, which impact directly on the investments costs. Furthermore, it is one of the main topics that interferes in the acquisition of the land and its purchase price. To put it in a nutshell, this analysis involves some actors such as engineers, urban planners, and lawyers in order to evaluate the site suitability. Frequently, an assessment is made of the soil conditions, utilities and existing infrastructure (e.g. electricity, water, gas and telephone), local accessibility, surrounding uses and zoning. It is important to note that this analysis drives the design concept and the construction cost of the building that will be used in the financial appraisal. The absence of any information concerning site characteristics, legal permissions process and construction costs can distort the investment time and costs flow, negatively influencing the business analysis.

Unless the developer is the landlord, all legal issues about the land should be evaluated. The legal investigation includes ownership, existing planning permissions, and any rights of way. Any error in establishing the extent of ownership, in terms of cost or time, in acquiring the land will critically affect the viability of the development. The legal team assess what matters will be necessary to acquire the land and which sort of risks are involved in the transaction.

The financial viability assess whether a project is profitable or not. To be more specific, measuring project return analyzes whether the hypothetical centre is capable of generating sufficient income to cover the investment cost and to produce a sufficient return expected by the investors as well. It is the major factor

that effects each decision making stage of the development process, from the land acquisition to detailed operations of the centre. Throughout the whole development process, the investor will be measuring the impact of their decisions on the investment analysis.

At this time, the development team focus their attention on a particular cost spread over a particular time. The previous analysis of the market, site and conditions acquisition drives numerical information, which will be imputed in the financial proforma. Firstly, it is essential that developers should understand the income sources generated by the hypothetical centre. As an income property, the centre generates earnings through rental income from the management of a particular activity. In the case of a centre, this one is the retail market and the most of the lease income comes from the minimum rent paid by the tenants. Therefore, the hypothetical centre size and tenant mix should be defined in line with the market analysis being that any misinformation can provide a false outcome for the decision making.

After that, the estimating cost should be evaluated. This one is divided into two sorts, the first one regarding the investments costs that includes all costs of the project such as the land acquisition, off improvements, marketing, fees, taxes, financing, leasing commission as well as soft and hard costs. The last one is the annual operating expenses of the centre, which is maintenance, management, property, taxes, and insurance. Kramer (2008) highlights that some of which expenses can be recovered from tenants and some of which cannot. Furthermore the budget also includes ongoing market costs as well as annual replacement reserve for periodic major maintenance.

From the investor´s point of view, expense and profit misestimating directly impacts on their profit margins as the tenant occupancy expenses have a direct effect on the profit margin. Moreover, considering that the minimum rent and the percentage rent paid by the tenants relate to retailing business performance, it is important to understand their relationship with the occupancy expenses to be able to monitor tenants' ability to consistently support this cost and whether they have the capability to absorb any rise in CAM/Taxes/Insurance/utilities.

Therefore, the briefing of building design concept upon which the preliminary construction cost and gross leasable area (GLA) is based should be shaped by a multidisciplinary view and include the complete interaction of important stakeholders such as the architect, lease team, engineer and investor. Frequently, the budget is forecast by using another centre as a reference, while making adjustments for the difference in quality or date when the project was undertaken. According to Kramer (2008), conceptualizing the centre is an interactive communication process in which the developer balances market potentials with available retailers, development concepts and available site.

Step 3 – site acquisition

In cases where the land has an opportunity to create value and the investor is not the landlord, it will be acquire by the site acquisition method for which the investors' strategy is more suitable (see KRAMER, 2008 for more details). The value of land is a determining factor in real estate development. For the residual method, the feasibility study provides the land value and the land cost level that can be supported by the investment. Furthermore, the land advantages and disadvantages assessed by economical, financial, marketing, environmental and social patterns can influence the purchase price.

Step 4 – design planning and public permissions

The centre design is a nonstop process which runs in parallel with other development stages and which is getting progressively more detailed in that the project progresses. It is a dynamic project in which the design is continually changing according to the tenants' requirements, therefore the stores that will be leased during the development process need to be adaptable. As time progresses, design decisions are made and some specialists consultants work with architects and engineers in elements such as structure, electrical and mechanical services. It is important highlight that details of the building are driven by the forecasting budget and cannot exceed its limits otherwise can have a negative impact the business. It is a complex stage that often requires a project manager. This actor is responsible for organising the architecture and engineering development and supplies the developers with important information about the compliance schedule and

building changes, which can modify costs and gross leasable area. The building design is planned according to time, cost and quality and usually is divided into phases such as feasibility, pre design, selection, design, construction (see WYATT, xxxx, for more details).

In parallel with the design process, public permission is necessary to allow for building construction and site improvement. It directly influences the development process as the building design progresses according to administrative analysis. Furthermore, delay in approval might interfere in the centre's launch date and changes business strategies.

Step 5 – construction
Construction is the fundamental stage of the development process. The building construction is the main portion of the investment and as a result a schedule delay or budget overrunning present a high risk for the business. Usually is a great deal of actors are involved in making sure that the centre is built on time and on-budget.

Step 6 – occupation and building operation
According to Wyatt (xxxx), some development models complete the process at the building occupation stage. Although the building construction completion may seem the end of the development process, is the start as far as the tenant is concerned. This stage provides the profit to the investor through rental income, which is affected by the occupancy rate and if this does not achieve the number forecasted in the feasibility analysis, the investment will be impaired. Furthermore, forecasting and current operating expenses (e.g. taxes, insurance and CAM) should be compared as a cost increase directly impacts profit margin and the investment quality.

3. SHOPPING CENTER SUSTAINABLE FEATURES

Sustainable development is defined as the use of environmental resources to meet the human needs without compromising its utilization by future generations[1]. Nonetheless, sustainable building and sustainability are yet subjective as thus far they have not a scientific definition. Both terms are habitually used to describe best practices and responsible decision-making, which diminish adverse effects upon the natural environment whilst maintaining the balance among social, economic and environment targets. The first term emphasizes these aims in the building life cycle, from the construction stage until the operation stage. The last one focuses on the political and firms' sustainable development goals using the Triple bottom line to incorporate this notion into business decisions, i.e. business decisions should not be taken merely based on economics objectives but should also consider environmental protection and social justice (see RICS 2009; Crawford & Whitson, 2013; Sayce 2013, for more details).

Furthermore, according to Crawford & Whitson (2013) the notion of 'triple bottom line' leads onto the concept of corporate social responsibility (CSR), which means company initiative to take responsibility for their decisions effects on the society, environment, stakeholders and shareholders. Looking into the shopping centre industry, social responsibility strategies of many landlords encompass their approaches to reduce their carbon footprint using sustainable features in order to try to become their buildings more efficient in its constructions and its day-to-day operations. However, the employment of these characteristics and the assessment of their performances are adversely affected by the lack of a clear definition as although it is becoming important for both owners and tenants.

According to Sayce (2013), landlords worldwide are voluntarily seeking to certify their buildings with some sort of sustainable certificate such as BREEAM and LEED in order to create one sustainable building identity. However, the certification only provides a quick reference point and the lack of a certificate does not

[1] Sustainable development was defined by The United Nations World Commission on Environment and Development (WCED) in its 1987 report Our Common. The report defines this term as the development which meets the needs of the current generation without compromising the ability of the future generations to meet their own needs.

indicate that a building is not sustainable or efficient. Thus, more than look for the possibility of a certification, some little and inexpensive modifications in the building design and operations strategies when applied into a standard business model can aid to lessen the adverse building impact upon the natural environment.

Beyond the natural environment impact there are important financial evidences for reducing environment impacts such as water and energy use costs as well as other utilities that are part of the operating expenses. According to Harris et al. (2012) the building operation generates 80-90% of the total building emissions, due to energy use for heating, cooling, ventilation, lighting and appliances. Furthermore, the authors highlight that the building maintenance and operation can negatively affect the environment in many other ways e.g. resource depletion, habitat destruction, pollution and costs related to these inputs are often second only to staff costs and so should be a key target for businesses looking to reduce overheads.

Carrying this fact further, Buildings are complex structures and it is probable that their components have some negative performance at the implementation or operation cycle when they are assessed by some sustainability criterion. These criteria encompass a range of environmental, social, economic and physical factors, which could influence the property value and the economic decision of the real estate investment (see RICS 2009; Crawford & Whitson, 2013; Sayce, 2013, for more details).

Therefore, the building design takes a main position in the increasing of sustainable buildings as it can incorporate environmental requirements into the creation process, facilitating the systematic connection of economical, social and environmental parameters as far as enhancing efficiency and spatial definition quality. In addition, best practices that aims the occupier wellbeing and heath while reduces the negative impact on the natural environment such as bioclimatic criteria e.g. natural ventilation, daylight, solar and thermal natural control, should return to be the conceptual bases of any architecture design. Architects and engineers have an important role in the improvement of ‘green building’ since one may propose high technologic or inexpensive design solutions that aid to mitigate the building life cycle impacts on the environment. In the same way, owners and developers should be aware that is possible to achieve sustainable goals and lessen operation costs using high technologies or basic conceptual changes on the design, which helps the operation and maintenance of the building.

Looking into sustainable features, according to the literature reviewed, highlighting RICS and BREEAM; there is below a brief of five aspects that should be taken into account the design planning and business development concept at the conceptual idea stage.

- **Land use**

It is important when buildings will be constructed on Brownfiel land. The use of contaminated land may occur after the remediation of soil.

- **Design**

The design has complex factors that can positively or negatively influence the operation and maintenance of the building as well as increase or decrease its impacts on the natural environmental. A good design takes in account: building orientation, internal natural light distribution, solar control, natural ventilation as well as natural parameters of cooling and heating. The building design requires its characteristics adapted to the local weather and relief (see Neila, 2004; xxxxx, 2012 for more details). Furthermore, from the investor point of view its impact on the building’s finances and investment profile must be measure.

Other important point is the quality of the spatial definition. The building should be flexible and able to adapt easily to internal changes without generates high waste of materials and time. Shopping centres are dynamics business and their physical elements must to attend the market necessities without degrade the natural environment surrounding.

Accessibility considerations are fundamental as shopping centre generates a high traffic flow. Community and environmental high impacts can undermine the business.

- **Construction materials**

The sort of material is capable of generate good or bad occupancy conditions as well as increase and decrease the building impact. Examples of building materials that might decrease the building maintenance and costs include accredited timber, local stone and reflective glass, while non recyclable products, non-biodegradable, non-re useable and imported hardwoods and stones when used in the design might be cautiously assessed. The ability to reuse and replace materials tends to improve their life cycle and value as well as embedding this as part of building use and design can potentially improve rental value as allows some amenities as frequent refreshing and replacement of materials (RICS, 2009).

Furthermore the material transportation should be taken into account. The purchase of materials that are far of the building site can negatively impact the environment with the high CO_2 emissions as their transportations requires a high fuel consumption as well as increase the construction costs

- **Health and wellbeing of the occupier**

The architecture design, construction materials and products using in the operation and maintenance of the building have directly influence on the health and wellbeing of the occupiers. Sustainable design and construction represents the integration of material and methods to create physical, environmental and human conditions. Thus, material choices and design concept can enhance worker performance and health.

At the design stage, it is important to note that artificially acclimated spaces are considered complex environments as the enclosed air has a range of chemical and biological components e.g. toxic substances and microorganisms emitted by a range of fonts that may be interacting according to physical conditions e.g. humidity and temperature of the air and ventilation. Furthermore, several studies have shown that the air inside of enclosed spaces can be more polluting than the outside air due to the air conditioning maintenance (see Neila, 2004 for more details).

In addition, wellbeing encompasses thermal, lighting, visual, acoustic and olfactory comfort aspects. According to RICS (2009), light in retail areas have demonstrated increases in financial performance through enhanced sales. These factors are thus direct and indirect, and may be recognised where the market understands the benefits they provide and occupants are demanding these benefits

- **Energy**

The building concept might include building designs features that minimise operational energy demand, primary energy consumption and CO2 emissions. Usually the most portion of the energy demand has been required to provide thermal comfort inside the shopping centre building and consequently, the increase of operating costs and 48% to 60% of electricity costs are caused by the air conditioning system. In view of the average management of a shopping centre, this increase has a great impact on the operating cost budget which nowadays can reach up to 45% of the occupancy expenses paid by the tenants to the landlord. Additionally, RICS (2009) highlights that the acknowledged relationship between carbon emitting energy use and climate change has made energy efficiency a matter of legislative compliance and of CSR policy for building owners and occupiers.

- **Water**

The building water systems have been low cost regarding to other occupational items. However, as an increasingly scarce resource, it is targeted for conservation. In addition, equipment designed to reduce consumption e.g. spray taps, and the use of grey water, particularly for maintenance of landscaped areas, are increasing be used for the building due to the local legislative rules or the CSR policies of the company.

The scale to which a building is designed for water conservation is important. The main water consumption in commercial properties is not for drinking purposes, so the benefits of water recycling and reuse is potentially important in locations facing water challenges (RICS, 2009).

- **Waste**

The management of waste is a key component of the environment and economic development. The building can improve its environmental efficiencies by eliminating waste by shifting away from waste management to resource recovery practices like recycling materials such as glass, food scraps, paper and cardboard, plastic bottles and metal, from the construction phase until the day-to-day operations.

4. EMPIRICAL STUDY

4.1. Methodology and aims

As previously stated in the section two, the real estate development process is, for the majority of developers, a subjective process at which individual experiences drives the decision making due to the lack of a systematic reflection. This circumstance defines the proposal as an empirical research based on observations of three aspects that affect development decisions making: [i] the developers' usual way to set up input data necessary to the feasibility analysis; [ii] stakeholders' perceptions related to the application of sustainable features and, [iii] investors point of view of business strategies connected to sustainability. Thereby, the qualitative case study methodology conducts the investigation in which the subjects are three shopping centres with different design aspects that consider or not sustainable features and are owned by large international companies. In order to delimit the location, the Brazilian market was chosen for two aforementioned main factors: [i] high growth rate of Greenfield development; [ii] high potential for absorption new developments according to ICSC data. Furthermore, considering that the centre business model is International (see White & Gray, 1996), some circumstance alter in each case due to local marketability to define the shopping centres, it was considering the membership of their owners and managers companies in ICSC and ABRASCE.

The research focuses on the development process, strategies and operation of these three different shopping centres developments in an attempt to identify the opportunities and challenges of investment decision making based on sustainable features. As the spotlight of the study is the investment decision making, the discussion is developed according to a scrutiny of two development process stages identified in the section XX, [i] project feasibility [ii] occupation and building operation. The intention of examining the first topic is identify the usual way to generate the information quantified in the proforma and how it impact on the future running costs and design quality of the building. In turn, the analysis of the second topic aims indentifying the error ration between budget and current costs by an analysis of the shopping centre operation performance in order to try to draw new premises at the project feasibility stage.

The reason for choosing these three shopping centre project was that they each represent very diverse characteristics of design even though the spatial definition, size and shopping centre type are similar. The differences are in design strategies that interfere in the operation of the shopping. The first shopping centre was designed with passive cooling/ bioclimatic strategies measured at the design concept. The second one is a standard model of a shopping centre with an enclosed track race mall and air conditioning system. The last one presents sustainable features applied to the project toward an eco certification.

The development of the proposal is, firstly, to concentrate on each development process individually and then to establish the connections between them. After that, indentify sustainable strategies that could be applied at a hypothetical concept design used to generate quantify information to the analysis of feasibility. To achieve the object, the research is divided into two phases. The fist one is the examination and comparing of the material provided by the companies and questionnaires answered by some development actors with reference design methods, management of the process and decision making. The last one is the application of the results obtained on a hypothetical feasibility study for a Greenfield shopping centre development.

Questionnaires mentioned above were responded through interviews led in an informal manner as semi-structured theme interviews with one or two interviewees at a time and they were free to develop their thoughts without getting fixed in previously framed answers. Questionnaires were prepared only to drive the

conversation through the main points identified in the theoretical part of the research. These questions had also the secondary objective to establish a criterion of research to understand the communication among the actors and how it is manager at the development process. In addition, some questions remained unanswered, as the development process is subjective as well as some decisions making are confidential to the company. Nonetheless it provided insight to the actions and the strategy of the company at the decision making stage.

Furthermore, it is important bear in mind that a framework of questions is not an objective research method being that interviewees have subjective opinions which have to be taken as such. The interviews provide qualitative information and their consistency cannot straightforward be proven. However It provide an easily method of research on which questions are cautiously analysed can offer valuable and updated information. In addition, in order to increase the reliability of the study the same questions were asked a slightly different way during the interviews as well as were answered by different respondents.