



MANAGEMENT OF ENERGY & WASTE AND SUSTAINABLE ENVIRONMENT IN SHOPPING MALLS – AN EMPIRICAL STUDY

Abhishek Jain¹, Prabhu Dayal Arya², Ashutosh Bansal³

¹Asst. Professor, Amity University, Jaipur, Rajasthan

^{2,3}Asst. Professor, IPS-CTM, Gwalior (M.P)

Email: ajain@jpr.amity.edu¹, pd_arya@yahoo.com², bansal.ashutosh22@gmail.com³

Abstract

The research identifies examples of best practice and provides practical recommendations for developers, landlords and occupiers regarding the sustainable design and management of shopping centers. The research involved a literature review and survey of DD Mall Gwalior, DB Mall Bhopal, TI Mall Indore and other shopping centers of varying size, age, design and location, and interviews with each center's manager to elect an understanding of managers' awareness of and approach to sustainability in shopping centers, research involved interviews to determine investors, developers, architects and cost consultants approaches to sustainability in existing and new shopping centers. In this paper, we have also discussed about energy management, waste management and use of solar panels in a commercial building like DD Mall.

Keywords : Mall, Sustainability, Energy, Waste, Shopping Centre.

1. Introduction

Around 18% of Indian CO₂ emissions are accounted for by non-domestic buildings. 21% of this is comprised by the retail, sport and leisure sector, excluding caused by travel to and from shopping centres and the storage and distribution of goods. The climate change bill states that CO₂ levels should be cut by 60% by 2050. Reducing the energy consumption of buildings is a critical policy objective. Building and energy certification regulations are supported by various planning policies developed and enforced by Government of

India, Ministry of New & Renewable Energy (MNRE). In addition, the rising costs of landfill and mandatory SITE WASTE MANAGEMENT PLANS will promote more recycling in commercial developments. The research included the detailed survey of 16 INDIAN shopping center's placed on GWALIOR city and interviews with their managers, as well as investors, developers, architects and cost consultant, covering both existing and new centers. Overall, shopping center's tended to score poorly in energy efficiency, climate control, water management and building management, but better in accessibility and waste management. Shopping Centre managers are tackling sustainable policy initiatives in several ways, namely through:

- **Lighting and energy use:-** Such as having contracts with green energy suppliers, roof resurfacing for improved insulation ,auto sensitive lighting, restricting opening hours of service yards and replacing refrigeration, many of which can be achieved when refurbishing.
- **Water consumption:-** Centre's generally scored poorly here; rainwater harvesting and water recycling system were not present in any centres, but water metering and water conservation system were almost universal.
- **Waste Management :-** Some centers have sophisticated on-site system for separating and recycling materials and 1 centers were rated highly for this. This is an area of sustainability that is taken seriously.
- **Accessibility and Travel patterns-Park and ride polices:-** Car park charging for

customers and car sharing schemes for staff is common. Several centers' also provides cycle racks, although few hand showers or other facilities for staff.

Many retailers do not rate sustainability issues very high; at the local level there are often less knowledge and enthusiasm than at head office. Larger tenants are interested, but many smaller retailers are not, being either less informed or pre-occupied with ensuring the survival of their business. This is worrying, as how retailers use the shops, they occupy is important. **Many large retail developers** take sustainability issues very seriously, aiming for Very Good or Excellent

Energy ratings. Marked differences between recent schemes and earlier ones exist, with key new features including. **Being mixed use of to maximize the** site and renewable energy use and maximize travel. Often planned as open schemes to blend with existing town centres, they are generally cheaper to build, maintain and run, as lighting, heating and cooling in public areas is much reduced or eliminated. The use of green roofs to lessen water run-off and to increase biodiversity. Water run-off from roofs can be used for lavatories and to top up water tanks for sprinklers. Fig. 1 show the entrance gate of DD mall.



Fig. 1: Entrance Gate of DD Mall

2. Literature Review

2.1 Sustainability in Retail Sector

Property is responsible for nearly half of the total carbon emission in India, 28 % are from domestic buildings and another 18 % are from non-domestic buildings, with transport and industrial processes comprising the remainder. The chart below shows the breakdown of non – domestic CO₂ derived from MNREs founding in 2001, with the retail, sport, leisure sector accounting for around 22 % of the Indians non – domestic buildings CO₂ emissions, the majority consisting of retail alone. In addition, if you think not only about how many journeys take place to and from shopping areas by both consumers and staff, but the actual supply chain, then indirectly, retail must account for a considerable proportion of the emissions from the transport sector. Given the INDIAN government's challenging targets published in the March 2007 draft climate change bill, including a 60 % reduction in CO₂ emission by 2050 (which may move to 80 % in the near future), reducing the energy consumption attributable to building, and in particular the retail sector, is a key policy objectives which will be fundamental in

forthcoming years. This research examined the following sub issues;

- Access
- Energy
- Amenity
- Transport
- Viability
- Water
- Materials
- Waste
- Air quantity
- Design and quantity

The increasing prevalence of Corporate Social Responsibility (CSR) statements highlights the sustainability awareness of many occupiers and developers [1]. These statements generally indicate how internal operations and their business activities are shaped by sustainability principles. Internally, most describe how they strive to incorporate environmental management into their activities. Leading organizations include reliance fresh, land securities and propping, all of whom incorporate sustainability into their property holdings and investments .

2.2 Shopping Centre Survey

Between October 2010 and February 2011 a detailed survey of Indian shopping centers, varying in size, age, form and location, followed by interviews with the shopping Centre managers were carried out. The survey involved assessing the baseline sustainability profile of a property and then rating it against others. The criteria were assessed:

- Operational energy efficiency



Fig.2: Inside view of a mall

The interviews gave managers the opportunity to elaborate on different aspects of the survey and to highlight sustainability features within centers, as well as changes and improvements that are being made and any issues that may be coming through as landlord concerns. Questions posed focused mainly on environmental issues, although most managers were encouraged to elaborate on other operational issues, for example, customer shopping patterns or ease of pedestrian movement around the Centre. Secondary research focused on a report which covers potential improvements in energy and water consumption and management of construction waste.

2.3 Operational Energy Efficiency

Research shows that up to 22 % of Indian energy use could be saved by simple, cost effective energy efficiency. Few center's surveyed scores highly in respect, with many of the schemes scoring poorly. Perhaps not surprisingly, smaller and older schemes tended to have lower scores, although this was not always the case, since 2000, the upstream sustainability charter stated that 91% of participating shops Centre owners said that there is room for energy efficiency improvement, although 63% of participants have

- Water management, including efficiency and re-cycling measures.
- Climate control (if any) including both type and age.
- Waste management, including storage, separation and on-site recycling facilities.
- Accessibility, by mode of transport, as this impacts on likely future economic performance.
- The presence or otherwise of an effective building management system.

reduced their CO₂ emission, collectively by 6.8 %. One 1970s Centre in the south of India has a commitment of a 7.5 % reduction in energy cost year-on-year energy target in the future and is planning to add three wind turbines to reach this. HVAC (heating, ventilation, and air conditioning) refers to technology of indoor and automotive environmental comfort. HVAC system design is a major sub discipline of mechanical engineering, based on the principles of thermodynamics, fluid mechanics, and heat transfer [2]. HVAC is important in the design of medium to large industrial and office buildings such as skyscrapers and in marine environments such as aquariums, where safe and healthy building conditions are regulated with respect to temperature and humidity, using fresh air from outdoors.

2.4 Water Management

The critical nature of water is recognized in green building programs throughout the world. Water efficiency is one of the five main categories for Indian Green Building Council's LEED certification. LEED credits related to water use include zeriscaped landscaping, water use reduction and innovative wastewater techniques. A major thrust of water efficiency is the reduction or elimination of the use of potable

water. Techniques such as rainwater capture, advanced wastewater treatment, grey water “harvesting”, and water-conserving plumbing fixtures are all tools that can be used to reduce the use of potable water. From a smart building perspective, however, the interest is in how we manage and monitor the water use in buildings. Monitoring and managing water use are really a part of the larger effort of the measurement and verification of a building’s performance [3]. Management of a building’s water use can no longer be receiving a water bill at the end of the month from the water utility and comparing the bill to the previous month’s bill. It is a water management system that monitors and manages water usage that will change the process of simply supplying water to managing the demand for water. Water use in commercial buildings obviously varies by building type, the type of plumbing fixtures, restrooms, landscaping needs, the use of hydraulic cooling systems, kitchens, cafeterias, etc. The baseline water use is calculated using building occupancy, a reduction of fixtures and fitting, and fixtures and fittings meeting or exceeding national or international plumbing codes and standards.

2.5 Waste Management

While all these people in shopping centers contribute to our nation’s economy, they also are generating a large amount of trash. Each Indian generates about 4.5 kg of trash per day, some portion of which can be found in a shopping center’s waste streams. From corrugated cardboard shipping containers to leftovers in the food court, solid waste is an issue for all retail facilities. The good news is that many shopping center managers have realized the benefits of implementing various types of waste reduction programs in their facilities. By working with supplier, hauling contractors, maintenance staff, and customers, shopping centers and other retail outlets have managed to cut costs through waste prevention and recycling, while demonstrating their environmental stewardship to the community [4]. Beyond recycling, retailers have also cut costs through waste prevention by identifying and eliminating items such as excess packaging at their source, before they become waste. Reusing items such as shipping pallets or

hangers also has great potential. And for shopping centers that decide to involve the public in their reuse and recycling efforts through public education and events, the result can be a positive image and an increase in shoppers. As more shopping centers are learning, a well-planned recycling program can produce savings: , Some shopping Centre management , saw its annual waste disposal costs drop by more than 40 percent between 2008-2010 , Real Shopping Center’s, once the largest trash producer in Bhopal, Indore, saved more than INR 67,000 from its waste disposal costs in a single year.

2.6 Accessibility

80 % OF THE SHOPPING center’s questioned performed well or better, meaning that shopping centers were generally fairly accessible by both public and private modes of transport due to their town Centre location. Some schemes provide park and ride polices ,although this is usually through the local authority rather than the shopping center’s. One shopping Centre manager also spokes of a new footwall counting system which is operating at the car parks entrance which is used to monitor the number of customers and their length to stay. Town Centre schemes have an advantage in this sector ,due to better public transport and less need for staff to travel by car. For instance, most of the staff in one town Centre schemes in the south of India walks to work or use public transport. Only 10 % of its staff use cars and there are few dedicated car spaces provided in loading bays for staff.

2.8 Building Management System

The survey sought information about modern building management system and weather tenants are provided with handbooks to help them act sustainability. The results demonstrated significant variation in practice.

Those which scored the highest contained, modern, effective system and those whose scores were especially high handed out guidebooks on efficient environment management, although not many carried out both [5].

There is some encouraging news –some centers are invested in modern building management system, and several of the samples are planning to provide guidance to their guidance to their tenants.

2.7 Retailors

Media attention on the retail sector often portrays a sector which is sustainable progressive, with some retailers forging revolutionary sustainability action plans. It is clear that, however, that attitude does not permeate through the whole sector, shopping Centre managers commented that larger tenants were taking action ,but many smaller retailers were not ,either because they were less well informed or else they were pre-occupied with ensuring the survival of their business. Indeed, our research suggests that overall, retailers do not rate sustainability issues very highly and operation cost and service charges are constantly under intense scrutiny by retailers. Our recent survey supports this view; in our winter 2007/8 corporate Real estate Survey. Retailers were less concerned with sustainability issues than occupiers generally. The key findings were-

- Quality of accommodation, property cost or business expansion rank far higher than energy savings.
- Energy efficiency and sustainability of buildings are ranked lower by retailers than occupiers generally and much lower than facts.
- Very few retailers use energy costs and the efficiency of a building as a negotiation strategy when leasing a building, unlike other sectors.
- Furthermore, far fewer retailers would be prepared to pay a green rental premium than in other sectors.

2.9 Energy

- Mixed use and Enclosure: Mixed use schemes maximize the use of the site and use of

renewable energy and minimize the need for travel, new centers are now often open schemes, as in Jaipur One, or covered rather than enclosed [6]. Open schemes blend in better with the existing fabric of town centres, finding favor with local planning authorities. They tend to more sustainable and cheaper to run, as lightning ,heating and cooling in public areas in either much reduced or eliminated.

- Heating And Cooling: in enclosed centers , natural ventilation for cooling and using the heat from shop units to heat mall areas is now commonplace. Balancing the amount of glazing to maximize daylight levels, but also to avoid unnecessary solar gain and air conditioning is important.
- Renewables: Incorporating renewable technologies is more effective in large mixed schemes, especially centralized CHP plants, as different uses of buildings are complementary in terms of energy requirements at different times of day. The proposed schemes of Bhopal City and TI Mall in Indore are good examples. Developers must ensure that retailers do not duplicate heating and cooling facilities.
- Efficiency: It is more cost-effective to reduce energy consumption rather than rely on renewables. Furthermore local authorities may accept a reduced energy demand in lieu of the use of onsite renewable energy.
- Service Yards :The servicing of shopping center's is an important issue for retailers and local authorities and hence for developers.



Solar Panel in Crystal Palm Jaipur

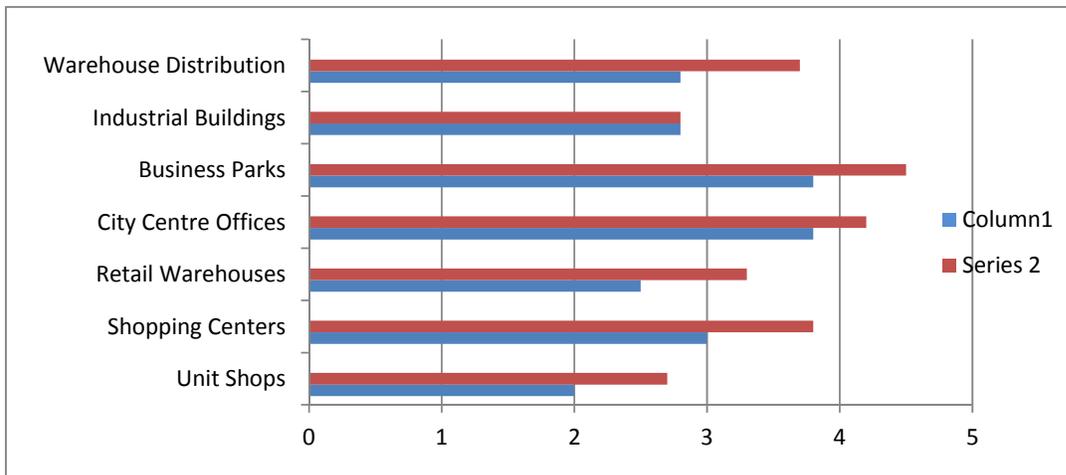
2.10 Retailers Waste

- Collection, separation, baling/compaction of waste to maximize recycling and minimize the use of landfill is now a common feature in existing and new shopping centres is reflecting the need to maximize recycling which will probably necessitate larger service areas to accommodate refuse bins and baling/compacting machinery.
- Investors interest in sustainability issues to some extent mirrors that of developers and retailers ,with larger investors leading the way and incorporating sustainability in decision making but not yet as a critical issue. Evidence for this comes from our 2008 investors survey , the key pertinent findings of which include;
 - 63 % of respondents attached some importance to sustainability issues when considering new purchases, whilst 30% classed sustainability issues of equal importance with other factors. However , only 6 % rated sustainability of no importance. Traditional consideration of location , yields , rental growth and rates of return are uppermost.
 - 73% of large institutional investors reported that they had assessed the majority of their properties against sustainability criteria ,or intended to within the next 12 months, compared with 45% for all investors . Larger investors gave a higher mean rating for the current sustainability off their portfolios ,than investors as a whole(mean rating of 2.4)
- In terms of property sectors in their portfolios, investors saw sustainability issues as having the largest impact on the office sector with shopping centres next in importance . This was a higher score than for retail warehouses and unit sops(as well as industrial property or warehouses) . Investors, such as Wipro Technologies, ONGC,TNPL etc , who are at the forefront of the sustainability agenda, believe that sustainability issues will become increasingly important to investors over the next few years. Whilst there is little evidence yet to stronger returns being achieved , many investors think this is inevitable , as the benefits of high levels of sustainability for shopping Centre investments can be summarized as being;
 - Better tenant retention , although at present this would largely relate to the larger retailers who are more concerned about sustainability issues.
 - Shorter void period between leases , but again this is probably more applicable to larger retailers than smaller retailers.
 - Higher rents eventually than in less sustainable centres , and stronger rental growth, as more retailers embrace the need to be sustainable.
 - Reduced rate of depreciation ,as more stringent regulations will penalize older, less sustainable centres.
 - More liquidity in the future, i.e, quicker to sell as more investors take on board sustainability issues.

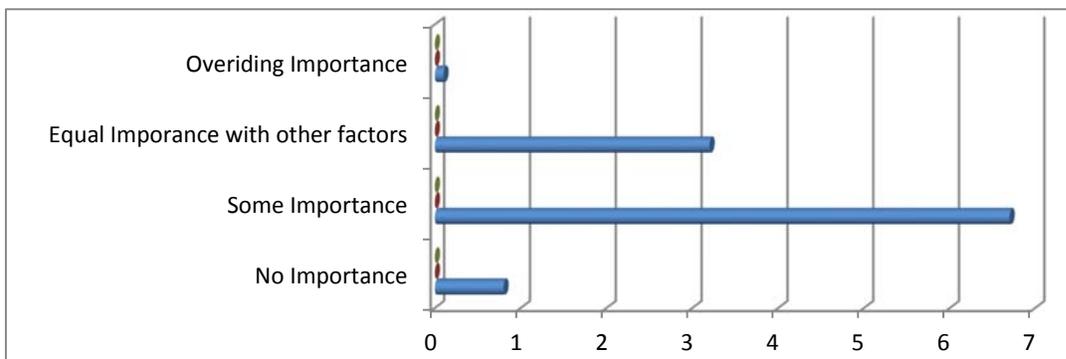


Fig. 4: Reliance Outlet in Patna

Sector-wise Impact of Sustainability



Importance of Sustainability for Investment



3. Summary of Findings

The use of illustrating that for existing shopping centers, sustainability performance varies considerably with age, location, size, weather centers are placed, covered, enclosed or open, and how they are managed. Only one Centre achieved an overall performance that was very good. Several followed just below this level of performance, whilst the majority were bunched together around an average performance level and a few performed poorly. The message coming through from the holistic scores was that age, location, size and type of Centre are less critical to sustainability measures, many of which can be factored in at refurbishment. A picture of poor performance is revealed in some areas, including;

- Energy Efficiency
- Climate Control
- Water Management
- Building Management
- Waste management
- Accessibility

Reference:

- [1] The state of Queensland (Department of Employment, Economic Development and innovation) 2010, Quick facts, Available:
- [2] Australian Standard 3598:2000 Energy Audits
- [3] Environmental Training Guide for IU Schools, Centers and Sections.
- [4] Energy Greenhouse Opportunities Act 2006 (commonwealth) and associated legislation
- [5] National Greenhouse and Energy Reporting Act 2007 (Commonwealth) and associated legislation
- [6] Environmental Training Checklist for IU Schools, Centers and Sections.