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INVESTIGATIVE STRATEGY FOR PASSIVE VERNACULAR DESIGN IN THE TEMPERATE CLIMATE

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Abstract: The paper aims at exploring a suitable research methodology to answer probable questions related to passive vernacular design for the temperate climates. It is believed that once the goal is set and appropriate issues for the research are identified, it is just a routine task for a designer to go through further phases of design. Though temperate climate is selected here for discussion, it is believed that a similar investigation procedure could be followed to tackle similar problems in other climatic regions.

Keywords: Research Methodology; Temperate; Climatic Design; Green Architecture; Vernacular

Introduction

In 'primitive Architecture' Enrico Guidoni (1987) discusses the social, cultural and climatic influences that have combined to shape a multitude of vernacular forms around the world. He argues against the over simplification of many studies that are based on purely climatic factors. The question, 'What came first, clothing or jewelry?' may be used to contradict the assumption that climate was the driving force behind shelter in so called primitive societies. Archeological evidence concerning slash and burn techniques and species analysis further questions the romantic non-anthropocentric view of man's historical relationship with the environment that today's green movement often portrays. Vernacular Architecture still however evokes a past when necessity of buildings, culture, social structure, available materials and climate is seen to be closely interwoven and balanced (Mowla, 1997a), while anthropocentric in motive comfort was a basic requirement.

Achieving internal comfort (or a form of it) is today taken for granted. It can be achieved in almost all climatic zones with remarkably similar architectural forms by using universal technologies that fight against, rather than work with, the local climate. These techniques negate the need for buildings to be planned and designed around the climate and have played a part in allowing architecture of either 'style' mundane functionalism or short-term economics to proliferate. Architecture has generally speaking, universalized a predominantly western culture and aesthetic. Central heating, air conditioning and fluorescent lighting, while bringing potential comfort, rely on natural resources and economic wealth to maintain conditions and have helped in eliminating any semblance of regional contextual design from today's architecture and planning. Despite this 'technological fix' severe localized discomfort often occurs where natural elements are allowed to impinge on sealed air-conditioned buildings (e.g. overheating and glare) and psychological discomfort where they are not. (e.g. lack of view and natural light).

The growth of what Oscar Newman (1980) refers as “style-metaphysicist” modern Architecture with its disguised successors of today (post-modernisms) along with growth of suburbs and cities shaped around the automobile (Memford, 1961), computer and television. This has reduced climatic passive design to the occasional private house aligned to face south on an idyllic but socially irrelevant site. These ‘alternative’ solutions offer little to the city and seems to be as out of context as the designs they criticize. They utilize an idealized site and thus microclimate with little thought to interweaving social, cultural and climatic factors. Thus southerly orientation is guaranteed and design solutions conform to a well-practiced norm. Rows of south facing terraces offer as little to social scale and contact, as do houses geared around the car. While western designer seems to have been busy making scientific studies of climatic problems in relation to planning in the third world countries; they have remained oblivious to this general drift in their way of thinking at home. Any urban climatic tradition has thus been lost (Jeremy, 1989) and with it the relevant skills in dealing with the microclimate around building in urban settings. In ‘The Architecture of the Well Tempered Environment’ Reyner Banham (1979) criticizes the solar movement of the 70’s for its ideological preference for ‘Low’ technology yet it was surely not this preference that was at fault but the location of the solutions beyond the city. A belief in passive design is not necessarily the ‘Luditism’ that Banham describes but a belief that a design skill has been lost due to uncompromising adherence to technology and an international style.

Passive Climatic Design:

Passive climatic design (utilizing all natural elements and how the site and local available materials modify them) is perhaps the only ‘permanent’ and free ecological design. It is a design method that reduces consumption at the point of use. It aims to work in balance with its context and thus should tend towards minimum maintenance (problems with pollution attack of the TIM at strathclyde (Brenda & Robert, 1991) show the trouble in developing even simple new solar technologies). Passive design requires the minimum of additional input of non-spatial or fabric technology (renewable or not) (Mowla, 1985a). Given the essential nature of thorough site analysis and study of microclimate, passive climatic design may also begin to break down the exclusively internal nature of today’s architecture and investigate landscape architecture and planning as an equal part of a continuum and not simply for its aesthetic value alone. This could considerably boost efforts to green cities in a variety of ways.

Passive Design is a means by which a new regional vernacular design may be developed, integrated with the cultural and social aspects of the specific site (areas that modern architecture has also failed to develop to any degree). Mats Egelius (1980) writing on the architecture of Ralph Erskine explains “That the planners of most modern housing ignore social experiences in favour of physical gains is shown by the orientation towards the sun, instead of towards the square and street”. He argues for architecture of social interaction. In meeting this criticism of much modern architecture passive design is faced with a considerable challenge, the answer to which may perhaps emerge from an analysis of the whole gamut of microclimatic factors not arrangement for one (the sun). It must not, as with the modern movement, become a style or use technology for its own sake. Each new scheme can also serve the city by adding to the microclimatic quality of the surrounding streets as well as that of the project itself thus increasing the general quality of our external environment. A considerable danger of non-local green design is the production of green buildings surrounded by desolate streets.

Investigation Strategy:

This paper is an attempt to define a guideline for a fruitful study on regional architecture design passively around the microclimate to green our cities (Mowla, 1985a) as opposed to product design

(active solar design products) or architectural design of universal applications (super-insulation). It may explore the energy saving potential of passive design and other features that may contribute towards greening cities. Will concentration on universal green technology, similar in spirit to modern movement technology developed since the Industrial Revolution inhibit the development of contextual climatic design? Will this prevent greening of cities either quantifiably (with the need to analyse a product from production process through to incorporation into design. i.e. life cycle costing, the advantages of passive methods including planning and landscaping are more attractive) or otherwise for example general environmental quality, sense of place and communication of green ideas? The studies may also aim to look specifically at housing on sites that restrict free solar use.

The opening discussion on solar design may compare relevant passive solar techniques and the energy potential they offer (Mowla, 1985b). How they cope with city conditions such as over shading and vandalism and how the operation of the systems by inhabitants are likely to influence design. Planning and spatial strategies such as zoning may be explored and their effectiveness gaged. Super-insulation, active solar heating and passive design may be compared in the light of indoor air quality problems in highly insulated low ventilation buildings, possible involvement in design by inhabitants, relationship to the local site and affect on quality of spatial design. The aim of the study should be to set a basic framework to which the findings of the specific cases can be applied. In order to set a specific microclimatic context, a design for a site in temperate climates could be used and effectiveness checked using calculated performances (Ralph, 1982; Mowla, 1985a). Recent research suggests that northern temperate latitudes have greater than commonly appreciated potential regarding passive design due to the long heating season. How much energy can be saved on partially shaded sites in the temperate city with its restrictions on glazing areas?

An overview:

In 'Sun, shade and shelter' Elizabeth Beazley (1990) describes what she considers as 'the forgotten art of planning with the microclimate in mind. This has to do with both the comfort and habitability of external spaces in and around buildings and the resultant potential for energy conservation in buildings. She argues that the exterior planning of a building should be intrinsic to its design from the earliest stages and that this is essential to the success of both the interior and the exterior of buildings. Too often landscape architects are left with dull draughty left over external spaces (SLOIP) impossible to ameliorate. While critical elements of the building will be subject to comfort and energy saving deficiencies such as glare, overheating, overshading, cold accidental ventilation air, wind buffering, water saturation of the fabric and copiously glazed rooms facing north. The separation of consideration of interior and exterior environments is synonymous with the decline of passive design. How often is the entrance to a building a smooth transformation in thermal conditions?

Site and context: Beazley (1990) uses mediaeval monastery cloisters, arcades, walkways, and colonnades as examples of a long tradition for provision of indoor/outdoor living that are functional elements of plan, useful, enjoyable, economic and particularly suited to a cloister which (in Britain and probably in similar climates) usually lies in the sun on the south side of the abbey church where it is protected from the cold north winds by the nave and the east and west by monastic buildings. It costs no more arranged thus than it would if the plans were mirrored with the cloister to the north (Beazley, 1990). With detailed design the benefits of such elements can be heightened (depth/height ratio for winter solar penetration, choice of materials to re-radiate heat). Instead we have an Architecture of interior consideration only, with a car park outside. We have become used to a hostile external climate with accelerated driving rain or lack of sun through which we rush to get to high tech inner retreats. These often-overheated (shirtsleeve) environments further alienate us

from the external environment. Buildings are sealed and 'outdoor rooms' unworkable and forgotten. As functional part of the plan a covered walk instead of an internal one would save on capital costs and on-going costs (heating bills reduced, less maintenance and cleaning due to robust materials). They also allow people regular easy contact with fresh air and nature that, at present, is a rare commodity in the city particularly on the doorstep.

Microclimate: Microclimate design on urban sites and its potential may thus be discussed as essential to developing passive solar design in the city. Much recent scientific research has been carried out in this area (Dodd, 1990) that backs up ideas of the traditional lost 'art' referred to by Beazely (1990). The links between external and internal planning and fabric design can then be explored and hopefully advanced to help energy conservation over and above passive solar techniques. The calculations as stated before could then also be modified and perhaps paybacks realized in the less rigid nature of planning possible allowing for 'social contact architecture'. Increased use of external spaces may be promoted (perhaps reducing internal thermostat levels) along with their consideration early in the design thus improving performance. Landscaping as pointed out by Darbourne and Darke (1980) is often crucial to the success of housing designs at lower income levels and comfortable external climates can only encourage success.

Vegetation: Vegetation plays a considerable part in microclimate design but is also of great value in greening cities and contributing to regional design in numerous other ways. Ecological landscaping, in Holland for example, has created wild landscapes of indigenous species that considerably enhance *genius loci* of a particular site. Since any site will have its own specific soil type and microclimate it will also have its own distinctive vegetation. Wasteland sites in many temperate climate cities are often seen covered with a profusion of natural vegetation that gives it a character that human interventions so often fail to do (Lord, 1987). The Dutch landscapes described by Allan Ruff (1987) often attempted to improve the physical /climatic conditions around their suburban slab blocks but predominantly concentrated on increasing interaction and participation of inhabitants with nature reintroducing natural human scale to concrete slab block schemes. Permaculture techniques and practices may hold the potential to introduce food production into urban areas and onto building. It also suggests techniques for the use of rainwater on landscaping and in the home reducing reliance on the over stretched national supply. In Britain food production schemes have also galvanized local communities into action in numerous ways increasing confidence and awareness of the potential of self help (Davidson, 1987). Local Environmental design has often been the start of community business initiatives that have helped towards regeneration. Pollution control by plants is also gaining recognition at the local and global level. Moffat and Schiler (1981) describe the potential of vegetation in reducing the quantities of gases such as sulphur dioxide in the air along with dust and dirt. In 'Greenscape' Jeremy Dodd (1989) details the amount of CO₂ locked up in one tree every day and the O₂ given off. Similarly vegetation can considerably reduce noise pollution. This type of study may also look at the work of people like Hermann Barges (1986) and SITE who use vegetation on buildings in a variety of ways.

Material: Various material alternatives may be discussed with reference to the development of a passive local vernacular. Consideration may also be given to the relative benefits of mass and lightweight construction, the potential of existing buildings and possibilities for local indigenous green materials (recycled or farmed). Concentration on a specific city by giving context will hopefully focus this large and complex question to which any comprehensive guidelines have yet to be formulated. Again this analysis could take place in the light of the passive design techniques discussed earlier and aim towards their improvement. In New Mexico Michael Reynolds has developed a mass solar wall system using steel radial types that he is paid to take away (Kroll, 1986). This is clearly a specific response to climate and local available materials. In the temperate cities, could an equally local supply of existing buildings, recycled bricks, scrap metal and the potential city farmed timber produce the raw materials for a living local passive vernacular?

Epilogue

Finally consideration may be focused on two areas of contemporary architectural thought and their potential for accommodation of passive design ideas. Participation and diversity are two theories that would seem to fit comfortably within a modern vernacular if they are not essential to it (Mowla, 1990 & Mowla 1997b). Lucien Kroll (1986) discusses traditional forms in terms of their slow adaptation to local conditions over time. In noting that buildings gradually become evolved to their site he acknowledges that the process of architecture is never a complete one. He thus argues against centralized impositions of rigid plans whose physical manifestation of grided streets are designed as little around the climate, geography and ecology as they are around designed around the people they were intended for. It is difficult for residents in large monolithic bureaucratic schemes today to modify them since each house is in the first place identical or at best a slight variation on a theme. Kroll (1986) thus argues that diversity within a project is valuable in its own right in encouraging interaction with the project. He has thus developed a system that uses the Dutch house building system in as diverse a way as possible. The relevance of this idea to passive solar design, that it has to be individually geared to the need of each inhabitant and changed over time seems to offer great scope for design. It also raises interesting questions concerned with climate change and the development of a system that can be adapted if necessary for the expected change. Participation is an essential ingredient in passive solar design since it must be used and modified by its inhabitants with changing social and climatic conditions from day to day and year to year. It improves understanding of the mechanics and thus generates proper use of the systems. It also gears these systems to the individual need of each inhabitant. Architecture is designed for the inhabitant who must live in and use the building. Such investigation should perhaps be careful not to postulate a form but a system of analysis capable of individual interpretation.

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