



A Study of the Principles of Building Planning

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Abstract:

Planning a building is an essential step in building design and construction. A properly planned building should fulfill functional requirements while providing sufficient natural lighting, privacy, comfort, and sanitation, effective circulation, ventilation, and resource efficiency. This paper reviews the major principles of building planning, including aspect, prospect, orientation, privacy, grouping, roominess, circulation, sanitation, flexibility, furniture requirements, elegance and economy. Additionally, the study compares their use in residential and educational structures and sustainable planning strategies are discussed. A qualitative comparative methodology is adopted using established building-planning principles and published guidance. The analysis indicates that successful planning depends on balancing functional requirements, site and climatic conditions, user needs, accessibility, resource efficiency and future adaptability. The paper comes to the conclusion that conventional building planning principles with contemporary sustainable-design approaches to create safe, comfortable, efficient and environmentally responsible buildings. The systematic arrangement of spaces, circulation, openings, structure, and services in a building in such a way that a The building is safe, efficient, comfortable, cost-effective, and appropriate for its location and climate. This paper reviews the major principles of building planning, including aspect, prospect, orientation, privacy, grouping, roominess, circulation, furniture requirements, sanitation, lighting and ventilation, flexibility, economy, safety and environmental response. The discussion is supported by planning diagrams and by findings from the supplied research paper on building shape, orientation and window-to-wall ratio. 300 models of homes with natural ventilation were looked at in that study, and found that building shape, zone arrangement, window-to-wall ratio and orientation can influence thermal comfort and lighting energy.

Keywords: Building planning, orientation, aspect, prospect, privacy, circulation, ventilation, daylight, thermal comfort, sustainability

1. Introduction

A building plan is more than a drawing of rooms. It is an organized response to human activities, site conditions, climate, construction methods, services and safety requirements. Good planning reduces unnecessary movement, provides adequate daylight and ventilation, separates incompatible activities, and makes the building convenient to use. The provided research paper emphasizes the significance of building orientation, window-to-wall ratio, and form. parameters affecting indoor thermal comfort and lighting energy in naturally ventilated buildings. Due to the fact that many performance characteristics are decided prior to the planning stage, construction begins. The supplied study notes that appropriate design at the initial stage can help achieve thermal comfort and lower electricity requirements without depending entirely on later renovation.

A building is a functional environment created to support human activities. Its performance is influenced not only by structural safety but also by how spaces are arranged and connected. Building planning determines the relationship between rooms, entrances, circulation areas, service spaces, openings and external areas before construction begins.

A good plan uses the available site effectively and responds to climate, orientation, access, privacy, sanitation, economy and future requirements. Traditional principles of planning remain relevant, while modern practice increasingly emphasizes energy efficiency, natural ventilation, daylight, accessibility and adaptability. Therefore, building planning can be understood as a process of balancing functional, environmental, social, aesthetic and economic considerations.

A good building plan responds to site conditions, climate, user requirements and functional relationships. The supplied research paper shows that building shape, orientation and window-to-wall ratio (WWR) can affect thermal comfort and energy for lighting in homes with natural ventilation

2. Objective

The primary goals are (1) functional suitability, (2) ease of use and movement, and (3) sufficient natural light. and ventilation, privacy and activity separation, economical construction and upkeep, safety, and sanitation, (7) adaptability to future needs, and (8) response to climate and site conditions (9) to explain the fundamental principles of building planning (10) to examine how these principles influence comfort, functionality and safety (11) to compare their application in residential and educational buildings (12) to identify sustainable planning strategies and (13) to develop practical observations useful for preliminary building design.

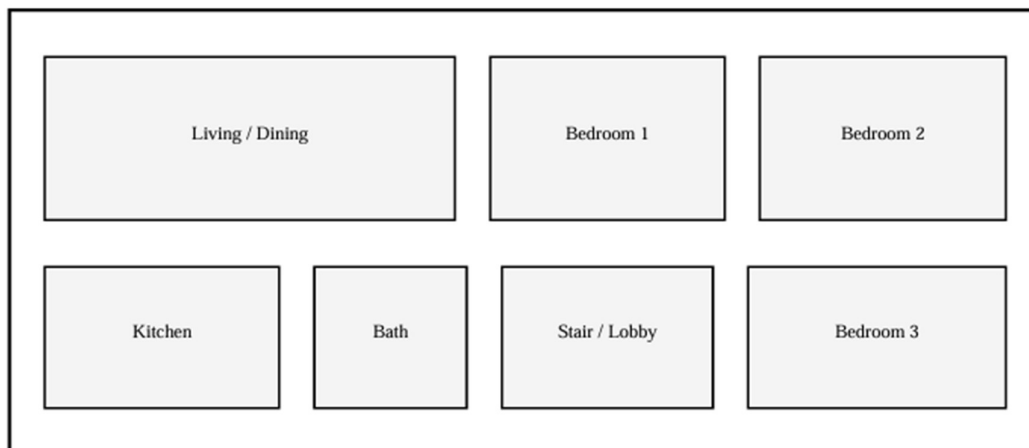
3. Aim of the Research

The aspect, prospect, orientation, privacy, grouping, circulation, and sanitation are all identified in building-planning literature. roominess and economy as important considerations in space planning. Government and institutional guidance also emphasizes orientation, natural light, ventilation and site-responsive design. Contemporary passive-design guidance extends these principles by considering solar exposure, shading, natural airflow and thermal comfort. Research on building-layout optimization further indicates that spatial configuration can influence energy performance. Together ,These resources demonstrate that early design planning decisions can have an impact on building comfort as well as user comfort. Performance.

4. Functional Planning and Zoning

Spaces should be arranged according to their use and relationship. Public spaces such as living rooms can be placed Semi-private areas like family rooms can occupy an intermediate zone near the entrance, while private bedrooms should be protected from direct public access. Service spaces such as kitchens, bathrooms and utility areas should have easy access while still maintaining privacy and hygiene

Illustrative functional zoning plan



5. Major Principles of Building Planning

1. Aspect

The arrangement and positioning of rooms, doors, and windows in relation to sunlight, wind, and other natural environmental conditions is referred to as "aspect," and it is one of the important principles of building planning. The main purpose of providing a good aspect is to ensure that each room receives suitable natural light, fresh air and comfortable environmental conditions according to its function. For example, living rooms and bedrooms should be planned in locations where they can receive adequate daylight and ventilation, while kitchens, bathrooms and utility spaces should have sufficient ventilation to remove heat, moisture and odours. The direction of windows and openings should also be considered with respect to the prevailing wind direction and movement of the sun. Proper aspect can reduce dependence on artificial lighting and mechanical ventilation and can therefore contribute to energy-efficient building design. The climate of the area, the conditions of the site, the buildings in the area, and the purpose of each room should all play a role in determining aspect. As a result, a favorable aspect enhances the building's health, comfort, ventilation, and natural lighting.

2. Prospect

Prospect refers to the view obtained from a building through its windows, balconies, terraces and other openings. It is an important planning principle because occupants spend considerable time looking outside, and a pleasant external view can improve visual comfort and the overall quality of the building. Preferably, important rooms like the living room, bedroom, and study should have nice views of gardens, open spaces, landscapes, or other nice places. In the same way, it's best to avoid unfavorable views like service areas, waste disposal areas, or crowded surroundings whenever possible. A large or well-placed window may provide a good view but also expose the occupants to nearby buildings, so privacy should also be taken into account. Landscaping, boundary walls and suitable positioning of windows can be used to improve the prospect. As a result, a good view provides "visual satisfaction," "better connection with the environment," and "improved architectural appearance."

3. Orientation

Orientation means positioning a building with respect to the sun, prevailing winds and surrounding environmental conditions. It is one of the most important principles of climate-responsive building planning because the orientation of a building directly influences solar heat gain, daylight and natural ventilation. The designer should study the direction of sunlight during different times of the day and seasons and should identify the prevailing wind direction before finalizing the building layout. Then, rooms and windows can be positioned to get the right amount of sunlight and air while minimizing heat gain. The provided research paper specifically examined the effects of 24 building orientations on thermal comfort and lighting energy by rotating models at 15° intervals. Thermal comfort was also found to be influenced by orientation, particularly in rectangular building models, according to the study. As a result, a building that is more "comfortable," naturally ventilated, and energy-efficient" can be made with the help of orientation.

4. Privacy

Privacy is the principle of protecting occupants from unwanted visual, physical and acoustic disturbance. A well-planned building should provide different levels of privacy according to the function of each space. Public spaces such as entrance halls and living rooms can be easily accessible, while bedrooms, bathrooms and other personal areas require greater privacy. Rooms should therefore be arranged in such a way that visitors do not have direct views into private spaces when entering the building. Windows, doors and circulation paths should also be positioned carefully to prevent unwanted views from neighbouring buildings. In residential buildings, the separation between public, semi-private, private and service areas is particularly important. Acoustic privacy should also be considered between bedrooms, living rooms and service areas. Proper privacy planning provides occupants with a sense of security, comfort and personal space, making the building more suitable for everyday use.

5. Grouping

Grouping means arranging rooms and spaces according to their functional relationships and activities. Rooms that are frequently used together should be located close to each other so that unnecessary movement is reduced. For example, the kitchen should be conveniently connected to the dining area, bedrooms should have easy access to bathrooms, and the living room should be connected conveniently to the entrance. Service areas such as kitchens,

toilets and utility spaces can be grouped together to simplify water supply, drainage and maintenance systems. Grouping should also consider privacy and noise so that incompatible activities do not disturb each other. Proper grouping creates a logical and convenient building layout and reduces unnecessary corridors and circulation spaces. Therefore, effective grouping improves functional efficiency, convenience, circulation and economy in building planning.

6. Circulation

Circulation refers to the movement of people within and around a building. It includes entrances, corridors, passages, staircases, ramps, lobbies and exits. A good circulation system should provide a simple, direct and safe route between different rooms and floors. Corridors that aren't needed and complicated ways to move around should be avoided because they make more space but don't make the space more useful. The main areas of the building should be easily accessible from the entrance, and visitors should not overcrowd private rooms. Staircases should be conveniently located and should have suitable dimensions and safety features. In the supplied research, staircase location was also considered as part of the building configuration, and the study noted that staircases can contribute to vertical air movement and natural ventilation. Thus, proper circulation provides convenience, safety, accessibility and economical use of space.

7. Roominess

Roominess refers to the adequacy and effective use of space within a room. A room should have sufficient dimensions to accommodate the required furniture, occupants and activities without becoming overcrowded. At the same time, excessively large rooms should be avoided because they increase construction and maintenance costs and may result in inefficient use of space. Room dimensions should be decided according to the purpose of the room, number of users, furniture requirements, ventilation and natural lighting. Adequate space should also be left for movement between furniture and around doors and windows. Room shape is another important factor because a well-proportioned room is generally easier to furnish and ventilate than an irregularly shaped room. Therefore, proper roominess provides comfort, usability, efficient furniture arrangement and economical use of floor area.

8. Lighting

Lighting is an essential principle of building planning because adequate illumination is necessary for comfortable and safe activities. Wherever possible, buildings should make maximum practical use of natural daylight through properly positioned windows, openings, skylights and other design features. The amount of daylight entering a room depends on window size, window position, building orientation, room depth, external obstructions and surface reflectance. Excessively small windows may result in inadequate daylight, while excessively large glazed areas can increase solar heat gain. The supplied research examined window-to-wall ratios of 20%, 40%, 60% and 80% and found that larger WWR could reduce lighting electricity requirements but could also increase thermal discomfort. Therefore, building planning should achieve a balance between natural daylight, solar heat gain and thermal comfort.

9. Ventilation

Ventilation is the process of providing fresh outdoor air and removing stale, hot or polluted indoor air. In residential buildings, proper ventilation is especially important because it helps control heat and moisture and improves the quality of the air inside. By providing suitable openings on opposite or adjacent sides of a room so that air can naturally enter and exit, cross ventilation can be achieved. Stack ventilation can also occur when warm air rises and escapes through higher openings while cooler air enters through lower openings. Windows, ventilators, doors and other openings should be positioned according to the prevailing wind direction and building layout. Kitchens and bathrooms require special attention because they generate heat, moisture and odours. The supplied study also considered the relationship between staircase arrangement and natural ventilation. Thermal comfort, indoor air quality, health, and energy efficiency all benefit from good ventilation.

10. Sanitation

Sanitation involves planning facilities required for clean and healthy living conditions, including toilets, bathrooms, kitchens, water supply, drainage and waste disposal. Sanitary spaces should be located conveniently but should maintain suitable privacy from living and sleeping areas. Bathrooms and toilets must have adequate ventilation to remove moisture and odours, while proper drainage should prevent water accumulation and leakage. Water supply and drainage pipes should be planned systematically so that maintenance and repairs can be carried out without

unnecessary disturbance to the building. Kitchen waste and wastewater should also be managed properly. Proper sanitation is essential because poor planning can lead to dampness, bad odours, contamination and health problems. Therefore, sanitation planning contributes directly to hygiene, health, comfort and durability of the building.

11. Flexibility

A building's "flexibility" is its ability to adapt to changing needs in the future. The needs of occupants may change because of family growth, changes in lifestyle, furniture, technology or working patterns. A flexible building can adapt to these changes without requiring major structural modifications. Movable or lightweight partitions, suitable structural grids and properly planned service locations can improve flexibility. For example, a large room may be designed so that it can later be divided into two smaller rooms if required. Future expansion should also be considered where the site and regulations permit it. Flexible planning increases the useful life of a building and reduces the need for expensive reconstruction. Thus, flexibility provides adaptability, long-term usefulness and economic benefits.

12. Economy

Economy means achieving maximum functional benefit with minimum unnecessary expenditure. Economical building planning begins with efficient space arrangement rather than simply reducing construction quality. Unnecessary corridors, excessive floor areas, complicated building shapes and inefficient service routes should be avoided. Rooms should be grouped logically to reduce plumbing and service costs, while a simple structural form can reduce construction complexity. Local and durable materials may also help reduce transportation and maintenance costs. However, economy should never be achieved at the expense of safety, hygiene, comfort or structural quality. The goal is to get the best performance out of the resources that are available. As a result, while adhering to the required standards, economical planning aids in the reduction of "costs" associated with construction, operation, and maintenance.

13. Safety

Safety is a fundamental principle of building planning and involves protecting occupants from fire, falls, structural hazards, electrical risks and other accidents. Safe staircases, adequate exits, suitable corridors, proper railings and emergency access should be incorporated into the design. Buildings should have sufficient natural and artificial lighting in circulation areas to prevent accidents. Fire escape routes should be clear and easily accessible. Electrical and service installations should also be planned carefully. Accessibility for people with different mobility requirements should be considered wherever applicable. Safety should be incorporated during the initial planning stage rather than added after construction. A safe building provides occupants with security, confidence and protection during normal use and emergencies.

14. Climate-Responsive Planning

Using "climate-responsive planning," a building is designed with the climatic conditions of its location in mind. Temperature, humidity, solar radiation, rainfall and prevailing winds should be studied before selecting the building form, orientation and opening arrangement. In warm climates, the design should reduce unwanted solar heat gain while encouraging natural ventilation. Shading devices, suitable window sizes, appropriate orientation and proper building materials can improve indoor conditions. The supplied research demonstrates that building shape, orientation, zone arrangement and window-to-wall ratio interact to influence thermal comfort and lighting performance. Therefore, climate-responsive planning can reduce energy consumption while improving occupant comfort and indoor environmental quality.

15. Aesthetics and Elegance

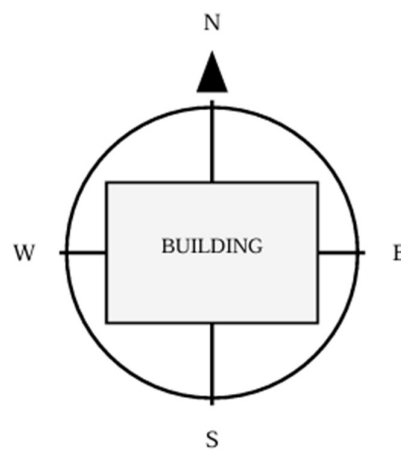
Aesthetics refers to the visual beauty and architectural appearance of a building. A building should not only be functional but should also have a pleasing form and relationship with its surroundings. Proportion, balance, rhythm, colour, texture, materials, landscaping and building form contribute to its appearance. The building's internal functions should be reflected in its exterior appearance, and it should blend in with the surrounding environment. Good aesthetic planning can improve the identity and visual character of a building. However, aesthetics should be combined with functionality, safety and economy rather than treated as an independent requirement. A successful building therefore achieves a balance between beauty, function and performance.

6. Building Shape, Window-to-Wall Ratio and Performance

The supplied research investigated square, rectangular and L-shaped two-storey houses, changing staircase position, zone sizes, orientation and window-to-wall ratio (WWR). The models used WWR values of 20%, 40%, 60%. The study found that WWR had a strong effect on thermal discomfort: increasing WWR from 20% to 40% increased discomfort by more than 20% in most cases, while 60% and 80% produced larger increases. At the same time, larger WWR generally reduced lighting electricity, showing that daylight and thermal comfort must be balanced rather than optimized independently.

For zone planning, changing zone sizes affected discomfort hours by up to 4.15% and lighting electricity by up to 3.74%. Changing zone locations affected thermal comfort by up to 2.48% and lighting electricity by up to 9.24% in the detailed analysis.

The study also reported that rectangular models with a centrally positioned staircase provided better thermal comfort for WWR 20%, while certain L-shaped arrangements performed better at higher WWR values. The authors elaborate that the central staircase may support both stack ventilation and cross ventilation.



Sun and wind direction should be studied before finalizing orientation.

7. Methodology for a Building Planning Study

A research-based planning study can follow these steps: (1) collect site and climate information; (2) identify users and activities; (3) prepare a space requirement schedule; (4) establish functional zoning; (5) test alternative shapes and orientations; (6) design openings for daylight and ventilation; (7) check circulation, privacy and services; (8) compare options for safety, cost, comfort, and energy efficiency; and (9) selecting and improving the plan with the highest performance. The supplied research provides an example of performance-based comparison. It developed 300 models and used DesignBuilder with an EnergyPlus simulation engine, evaluating lighting electricity and adaptive thermal discomfort

8. Sustainable Building Planning

Sustainable planning aims to reduce energy demand and environmental impact while improving occupant comfort. Climate-responsive orientation, appropriate glazing, external shading, natural ventilation, and other important strategies daylighting, efficient services, durable materials, water conservation and landscape planning. These measures should be considered additions rather than integrated into the planning process.

9. Conclusion

Principles of building planning provide a framework for creating buildings that are functional, comfortable, safe, cost-effective and considerate of the environment. The most efficient strategy is the result of a combination of balancing site, climate, orientation, zoning, circulation, openings, privacy, services, structure and user needs.

This approach is supported by the provided research, which demonstrates that shape, zone arrangement, WWR, and orientation interact and can influence thermal comfort and lighting performance. Therefore, building planning should combine established architectural principles with performance evaluation wherever possible.

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