Developing Vernacular Passive Cooling Strategies in (Kurdistan-Iraq)

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Contents:

• Space Cooling by natural ventilation:
• Ventilation strategies in vernacular architecture:
• Application of traditional solutions of natural ventilation integrated with the technology:
• Vernacular ventilation strategies in modern building:
Can Vernacular design strategies adapted to improve the energy performance of modern architecture in Kurdistan??

• Identifying passive cooling strategies that were used in hot climate
• adapting architecture to the climate environment through modernization passive ventilation solutions for building.
• improving the effect of using natural ventilation on reducing cooling load through utilizing the vernacular principles for cooling.
• explain the possibility to adapt them and applicability of these strategies in building in Kurdistan.
2.1. Traditional solution for minimizing solar gain:

2.1.1. Courtyard:

courtyard is one of the most significant feature of houses in middle east and Kurdistan plain regions vernacular architecture.
2.1.3 Haiwan: It is a covered hall with three walls (between two rooms) and the fourth side is completely open to the fresh air and overlooking to the inner courtyard. It has higher roof from the other rooms.

First floor plan
Haji rashid House
Haji Rashid House in Sulaimany
• 3. wind catcher:

• The wind tower found in vernacular houses helps direct air into the house. Wind towers are used throughout the Middle East to cool homes by utilizing the ever-present high winds.
• 4. Application of traditional solution of natural ventilation integrated with the technology:
  • Combining vernacular design strategies with contemporary needs can improve the aesthetics, identity, social, structural, and environmental performance of Kurdish cities.
• Application of traditional solution of natural ventilation integrated with the technology

**Fan Induced Stack Ventilation:** In an effort to make stack ventilation more significant, some advanced stack ventilation strategies that maximize the natural energy sources available from both the sun and wind has been developed.

whole-house fan  • attic extractor fan
Solar-Powered Stack Ventilators

Some innovative such as solar-powered stack ventilators devices which uses both wind and solar energy to operate like solar-powered wind catcher and solar-powered turbine ventilator it can be used to enhance the performance of the stack ventilation strategy.
Advanced wind tower:

• To increase the amount of air flow through the building few small fans can be added to traditional wind catchers to enhance ventilation within the building.
• Vernacular ventilation strategies in modern buildings.

• 5.1. The Inland Revenue Building in Nottingham: many green strategies are applied in this building whose purposes are to increase the natural ventilation. Such as:
  • improving stack ventilation by using thermal towers because Fresh air is drawn through underfloor duct which can be mechanically induced.
  • maximization of daylight
  • Using natural ventilation
3 Lycée Charles School in Damascus, Syria: is an effective example for using natural ventilation strategy in modern building. The systems are developed and the important point is that the architects indicated that deciding to erect a building in the Middle East without air conditioning.

Natural ventilation system of the classrooms is achieved by using courtyard that shaded by trees and advanced solar chimney for increasing air movement.
Modern wind tower in Masdar city—Abu Dhabi: Many passive design strategies that were inspired by the traditional designs in the region can be seen in the design of the Masdar city to provide the highest quality of life with the lowest environmental impacts. The design has an enhanced microclimate through shade, material selection for thermal mass, wind movement and evaporative cooling from water features. Redesign of traditional wind tower that brings cooling breezes to courtyard.
Conclusion:

- natural ventilation is the most effective strategy to be adopted in order to control the indoor comfort
- A proper design of the court yard combined with a correct design of the solar chimney is one of the methods can lead to an effective natural stack ventilation strategy.
- There are some strategies that have a strong chance of being incorporated into the contemporary architecture in Kurdistan such as, fan Induced Stack Ventilation and Solar-Powered Stack Ventilators.
- The analysis of the Modern passive buildings highlights that sustainable design systems that are derived from vernacular architecture can be adapted to the contemporary architecture in Kurdistan
- Redesigning these systems with sustainable principles and using new technology are some effective solutions for strategies that can struggle with harsh climate such as wind tower.
Thank you

Any questions??