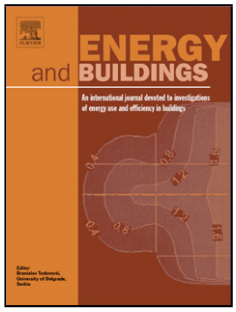

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A Comparative Thermodynamic and Economic Analyses and Assessment of a Conventional HVAC and a VRF System in a Social and Cultural Center Building

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Abstract: HVAC systems in buildings are composed of many subcomponents which consume energy in huge amounts. In recent years, energy consumption becomes very important aspect due to the lack of energy resources and environmental reasons. In terms of energy consumption, the components of HVAC systems account for large portion of total energy used in buildings. Therefore optimization of energy consumption in HVAC applications is an essential requirement in terms of thermodynamic and economic point of views. Besides, the efforts for decreasing energy consumption turn into economic recovery. It also provides benefits for human health and cleaner environment. In this paper, as originality, thermodynamic and economic analyses of an existing social and cultural building which has a heating and cooling area of 8852 m^2 are presented by comparing of a conventional HVAC and a VRF system. A novel contribution is given to the open literature by comparing two systems with actual data measured from the existing system. The other originality is to apply and test a VRF system to a complex-structured building. This study is a rare one which contains insulation, heating and cooling accounts of a building together. In this paper, VRF system is modelled to the existing building for the comparison of the conventional HVAC system. Both systems have been compared in terms of heating and cooling capacity, initial, operation and maintenance costs. It is found that the VRF system is more economic and efficient such that the VRF system is found to have 44% cost profit when compared with the conventional HVAC system.

Keywords: HVAC, VRF, Thermodynamic analysis, Economic analysis, Heat transfer.

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