In this paper, the Fuzzy Nanofluid Model (FNFM) used to develop a fuzzy analysis investigation on heat transfer optimal performance at different Nanofluids flow rate. The fuzzy Nanofluid model is applied to examine the effects of heat transfer parameters on heat transfer performance. Silicon Oxide SiO_2 Nanofluid is used to explain their effects on heat transfer by two methods traditional and fuzzy (with two shapes of member ship function triangular and trapezoidal). This study evaluates the effects of nanoparticles SiO_2 with different value of particle concentration PC (0.0-4.0%) using the water as a base fluid. This investigation covers a Reynolds number (Re) in the range of (100-500) as a flow rate (FR) for laminar flow. The main objective of present research, first one, compared a developed FNFM model with traditional model (TM) and determines how fuzzy model plays a significant role in prediction of Heat Transfer performance. Second one, to provide developed methodology for performance evaluation of heat transfer by connecting more than one parameter to a single output which is invaluable supplements relative to classical models. Third one, a developed FNFM can be used as a help tool for decision making to get the best judge (optimum) the performance of any system. The results of fuzzy model showed the heat transfer of SiO_2/H_2O Nanofluids significantly increased the PC compared with the increase in FR. However, however, using this method, there will be no need to resort to solving complex equations to arrive at a representation of the performance of any system. Finally, the study shows that fuzzy model plays significant role in prediction of heat transfer investigation without the complexity of mathematical tradition models. The correlations coefficients R^2 between TM and FNFM models for heat transfer coefficient (0.97) and the average relative error (ε) is ((4.4%). FNFM models can predict heat transfer characteristics with higher accuracy than that of the traditional model.