Kelempayan is a fast-growing species which provides both opportunities to satisfy the increasing need for wood composites and contribute to reduce environmental issues. The main objective of this study is to determine the properties of Kelempayan particleboard under the laboratory conditions and to evaluate the potentials of Kelempayan wood. Alkaline treatment was conducted to remove barrier for the interaction of particle and resin properties of Kelempayan particleboard under the laboratory conditions. FEA covered heat transfer properties, bending performance analytically. FEA covered heat transfer properties, bending with two fibre ratios which were at forty (40:60) and thirty (30:70) radial positions of the tree. Sampling and preparation of samples for physical and mechanical properties of particleboard were determined. Preparations of test samples and evaluation of board performance were carried out according to Malaysian Standard (MS, 2005). From this study, the statistical analysis revealed that tree portion and radial position significantly affect the physical properties. Chemical properties from bottom to top portion of the tree did not show any significant difference. For particle analysis, particle size was found to affect particle geometric characteristics. In the manufacture of untreated particleboards, all parameters including particle size, board density, resin content and hot press temperature had significant effect on physical and mechanical properties of boards. For chemical analysis of treated samples, alkaline concentration had significant effect on chemical composition. In manufacturing of treated particleboards, both main parameters of particle size and alkaline concentration significantly affect the physical and mechanical properties of boards. It was concluded that alkaline treatment was effective to improve mechanical and dimensional stability of particleboards from Kelempayan wood. Correlation of particle characteristics, physical and chemical properties had less association with board properties. Regression analysis of the data revealed that there is a very good relationship between the manufacturing parameters and board properties.

Agriculture sector contributes abundant residues such as bamboo, kenaf and coconut coir fibre. Nowadays, agriculture wastes have the potential as supplementary raw materials due to shortage of forest resources. These residue materials can be fully utilized as a new product through a combination of non-bio material such as synthetic polymer to form bio-degradable polymer composite. This study focused on analyzes the performance of fluted natural fibre reinforced High Density Polyethylene (HDPE) roofing panel using Experimental Analysis and Computer Aided Engineering Analysis. Three types of boards were produced which were Roofing Panel Bamboo Composite, Roofing Panel Coconut Composite, and Roofing Panel Kenaf Composite. Each board type were produced with two fibre ratios which were at forty (40:60) and thirty (30:70) percent. The properties investigated were density, water absorption and thickness swelling, Scanning Electron Microscopic, thermal conductivity, thermal expansion, bending strength and stiffness, tensile strength, impact, and effects of accelerated aging cycle on water absorption and tensile strength. Finite Element Analysis (FEA) was used to analyze the performance analytically. FEA covered heat transfer properties, bending strength and tensile strength. In this study, prototype roofing panel from bamboo, kenaf and coconut coir was also manufactured. The prototype was tested and compared to the industry roofing panel in terms of some physical and mechanical properties. As the result of these investigations, it was concluded that agriculture residue (bamboo, kenaf and coconut coir) were technically suitable raw material for the roofing panel. Kenaf with ratio of 40:60 gave highest density value and lead to better mechanical performance at 21MPa for flexural strength and 14.67MPa for tensile strength. Positive relationship was found on the effects of density on water properties and mechanical properties. There was no interaction found in accelerated aging cycle test between ratio and condition except for Bamboo Forty (B40) tensile strength and Kenaf Forty (K40) tensile modulus. The HDPE composite in this study shows comparable values for thermal conductivity and water absorption. It gave value of 0.17 W/mK while Polycarbonate from industrial roofing panel value was at 0.19 W/mK. The primary benefits from this research may be the development of new products to serve growing markets, and thereby relieving some of the pressure to harvest our forestslands.