

**Effect of the Resin Content and Density on the  
Properties of three layer Particleboard from  
Kelempayan (*Neolamarckia cadamba*) and Wood  
Shaving**

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**Abstract**

Particleboard are composite panel product consisting of cellulosic particle of various size that are bonded together with a binder or synthetic resin under heat and pressure. The species of kelempayan (*Neolamarckia cadamba*) with diameter 40 cm at breast height (DBH) 25 m height, from 1 log diameter was converted into particle by using scale knife ring flaker. The target density were  $500 \text{ kgm}^{-3}$ ,  $600 \text{ kgm}^{-3}$  and  $700 \text{ kgm}^{-3}$ . The particle used in this process were unscreening and was further dried to a certain moisture content. The particleboard were produced in different densities, resin contents; 8%, 10% and 12% with addition of 1% wax with using adhesive urea formadehyde (UF). The particleboards were tested to determine the physical properties of particleboard according to JIS 2003. From the variance densities shows highly significant on modulus of rupture (MOR), internal bonding (IB) and water absorption (WA). Meanwhile, for modulus of elasticity (MOE) and thickness swelling (TS) were significant. Source of variance from resin content showed the highly significant on internal bonding and thickness swelling but for modulus of rupture, modulus of elasticity (MOE) and water absorption (WA) that are only significant. The mechanical properties, from particleboard on density  $700 \text{ kgm}^{-3}$  with resin content 8%, 10% and 12% were achieved the standard. On physical properties, particleboard density  $500 \text{ kgm}^{-3}$  with resin content 10% and 12% were achieved the JIS 2003 specification. Whereas, for resin content, impact can be observed only on modulus of rupture (MOR), thickness swelling (TS) and water absorption (WA).

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background of study

Wood is a valuable natural can be refurbished material that has helped countries lead a sustainable development over hundred years. The plywood, as an alternative to natural wood, was devised in the 19<sup>th</sup> century, but by the end of the 1940s there was lacking lumber around to manufacture plywood affordably. Particleboard was intended to be a replacement composite as any combinations of two or more materials, in any forms and for any use (Carll, 1986).

The industrial development of the particleboard has been characterized by large and dramatic change in equipment, resins, and levels of automation since its inception in the early forties. Particleboard is wood composite make from wood particles such as chips, saw mill shavings, or even sawdust, and a synthetic resin or other suitable binder, which is pressed. It applications as furniture, flooring, table, counter and desktops, office dividers, wall and ceiling, stair treads, interior signs, home constructions, bulletin boards, and other industrial products (Tabarsa, Ashori, & Gholamzadeh, 2011).