APPLIED ECONOMIC ORDER QUANTITY (EOQ) IN LOGS RAW MATERIAL INVENTORY CONTROL FOR PLYWOOD INDUSTRY

Makkarenru, Akira Nakayasu*, Katsuyu Osozawa* and Masahiro Ichikawa**
The United Graduate School of Agricultural Sciences, Ehime University, Japan; Faculty of Forestry, Hasanuddin University, Indonesia
*Faculty of Agriculture, Ehime University, Japan
** Faculty of Agriculture, Kochi University, Japan
Corresponding authors email: akha_unhas@yahoo.com

ABSTRACT
One of the most difficult aspect of plywood industry is control inventory. Logs as the main raw material for plywood industry are the first and foremost form of inventory. Without proper planning, a manufacturing company can run out of raw material, negatively impacting the company and its customers. The aim of this study was to evaluate logs raw material inventory control applied at a plywood industry in South Sulawesi, Indonesia. For the purpose of the study, data of logs raw material consumption during sixteen years (1996-2011) were collected. In order to find out the demand of logs, data analysis is done periodically (time series data) by using single exponential smoothing model (SES). Mean Absolute Percentage Error (MAPE), Mean Squared Error (MSE) and Mean Absolute Deviation (MAD) are used to measure of logs forecast accuracy. Economic Order Quantity (EOQ) model and Re-order Point (ROP) were used to address the most fundamental question in inventory control, ‘how much inventory should be ordered?’ and ‘when should be ordered?’.

Key words: Plywood, logs, inventory, EOQ

INTRODUCTION
Indonesian forest product industry, during the period 1980-2007, has experienced rapid growth and structural change and played important part in Indonesian economy through a significant role as a gross domestic product, foreign exchange, government revenue, and employment contributors, Simangunsong (2010); World Bank (2006). Plywood industry has a golden era in 1993, when the manufacturers employed up to 455.500 workers and manufactured 10 million m$^3$ of plywood, with 90% heading to export markets, ITTO (2009). Since then until just before the crisis, wood products were the largest contributor of manufacturing sector, Aswicahyono (2004). However, the growth of this industry has decreased in line with the decline in log production from natural forests, while the production of logs from plantation forests has not been able to replace it. The direct impact due to the deficit of raw materials is the decrease of wood industrial capacity, especially plywood industry from 99% in 2007 to 42% in 2005, MOF (2007). Furthermore, rapid growth of this industry has created a special imbalance of supply and demand for logs as raw material, Guritno and Murao (1999).

Wood availability, though the major factor contributing to the growth of the plywood industry, has not received the attention, which it deserves. The industries emphasis was on the uncertainty of availability of timber and the periodic cost hikes caused by the revision of the royalty rates for timber supplied from the Government forests. Availability of adequate quantity of timber of the right quality at reasonable price on a sustained long-term basis is the most important factor in the growth of the industry. One of the most difficult aspects of manufacturing system including plywood industry is to control inventory, Henry (2010). Inventory represents an important decision variable at all stages of product manufacturing, distribution and sales, in addition to being a major portion of total current assets of many businesses, Temeng et al. (2010). Inventory Management is pivotal in effective and efficient organization, Adeyemi and Salami (2010). Without proper planning, a manufacturing company can run out of raw material, negatively impacting the company and its customers. Wood product industries should carefully plan and manage inventory, Henry (2010). Inventories perform a number of vital functions in the operations of a system, which in turn makes them critical to the production sector as well. Without inventories, manufactures could not hope to achieve