ABSTRACT

Product differentiation gives much advantage to manufacturing firm. Increased product variety allows a closer match between customer preference and offered product, and also higher market share related with the firm marketing segmentation strategy. On the other hand, higher number of variety produced will caused operational inefficiency when production system switches from making one item to another, higher cost for material and component procurement, and also for finished product distribution. Additional cost will be also incurred related with product development, employee training for new product, marketing strategy, and also for customer service.

In this research, the effect of number of product variety produced as Make to Stock to production-inventory system performance will be examined. Estimation model will be constructed with production-inventory system performance indicator, such as: inventory level, holding cost, shortage cost, total inventory cost, inventory turn over, warehouse utility and also for customer service level. The evaluation will be examined using Monte Carlo simulation to production-inventory model.

The system reviewed is cylinder liner production-inventory system with multi item product make to stock which share the same production facility and a finite capacity. Finished product is hold in a separate buffer stock and the inventory control system uses periodic review base stock policy with forecast. If available, each order is always satisfied from stock, otherwise it will be considered as a lost sales and shortage cost will be incurred. The stock report will be reviewed periodically and using forecast and buffer stock policy production order will be sent to production facility. To reduce setup time, products are produced in batches.

The result shows that inventory level and warehouse utility is almost linearly increasing for higher number of product with inventory level in amount of 8360 pcs/month and warehouse utility of 70 % for amount of 42 product varieties. Consequently, same condition happened to inventory cost. It also indicates that inventory turn over and customer service level is decreased over product variety, but become stable over 25 product variety, which finally yield 0.51 for inventory turn over, and 94 % customer service level for 42 product varieties. This result will give estimation model for system performance if product variety decision is made. The analysis provided is capable to support strategic decision making related with number of product variety, either increasing of decreasing, delayed differentiation, and product consolidation.

(Keywords: Production-inventory system, differentiation, product variety, performance measurement)