Wanvipa Seraneevijaikitkhan 2007: Production Efficiency Improvement by Using Computer Simulation Models: A Case Study in Roasted and Ground Coffee Plant. Master of Science (Agro-Industry Technology Management), Major Field: Agro-Industry Technology Management, Department of Agro-Industry Technology. Thesis Advisor: Mrs. Parthana Parthanadee, Ph.D. 106 pages.

Roasted and ground coffee industry has grown very rapidly during the past decade and become one of the highly competitive businesses in Thailand. Despite numerous coffee importers and international franchises, the number of domestic coffee plants has increased to sixty in 2006. To be viable in this business, the domestic manufacturers need to reduce costs and improve their production efficiency.

In this study, the production system of a small roasted and ground coffee plant was investigated using computer simulation technique. Computer simulation model served as a decision support tool for comparing the current production system to three alternatives for capacity planning, which were 1) determining optimal workforce levels for various future demand scenarios, 2) increasing the workforce level and changing the working schedules of the workers at some operations, and 3) replacing bottleneck manual operations with a small-scale automatic machine that could significantly improve both the productivity and quality of the produced coffee beans. The cost and performance measures of all the three alternatives were analyzed and compared.

The comparisons of model output between three alternatives showed that investing in the automatic sorting machine to replace sorting workers at the bottleneck operation was the best choice. It could completely eliminate the number of overtime hours, and the average number of working hours per day at the sorting operation was reduced to 3.36 hours. For the economic analysis, when the annual demands had continuous increasing pattern at 20% per year with a discounted rate of 8%, the discounted payback periods for capital investment on the automatic sorting machine were 23 months if compared with increasing workforce at the sorting operation, and 29 months if compared with changing the working schedules of the workers at sorting and packing operation.

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