An Economic Assessment on Two Investment Options for Bulk Sugar Dispensing Methods in The Warehouse of An Seaport Firm

Phatchara Sriphrabu [1,a], **Chettha Chamnanlor** [2,b], and **Rujapa Nanthapodej** [3,c,*]

[1] Department of Nautical Science and Maritime Logistics, Kasetsart University, Chonburi, Thailand
[2] Department of Industrial Engineering, Faculty of Engineering at Sriracha, Kasetsart University, Chonburi, Thailand
[3] Department of Industrial Engineering and Management, Nakhon Phanom University 48000 Thailand

E-mail: [a]phatchara.sr@ku.th, [b]chettha@eng.src.ku.ac.th, [c,*]nanruja@npu.ac.th (Corresponding author)

Abstract. This study compares the economic pros and cons of two bulk sugar dispensing methods for a particular firm, which will be referred in the rest of the paper as "The company". Bulk sugar dispensing is the process of transporting sugar from a warehouse at any port to berth for loading onto a cargo ship. Currently, the company has already implemented both methods in different warehouses. Method-1 starts with a backhoe scooping sugar into a rotainer, which will be loaded onto a flatbed truck (Toil). Next, the rotainer will be transported from warehouse to a buffer point, where all rotainers will be lifted by a reach stacker, and be transferred to a trailer. Then the trailer will carry the rotainer to berth, and unload the sugar onto the cargo ship. With Method 2, sugar will be transferred by a conveyor system and stored in a hopper. Next, sugar will be dispensed from the hopper to a trailer carrying a rotainer, then got transported to berth, and then unloaded onto a cargo ship. We found that the Method-2 took 35.38 minutes less than the Method-1on average, while the Method-2 has a higher investment about 72 million baht. In our economic study, we found that labor cost increases by 5 percent per year, then the net present value (NPV) will be 19,280,248.69 baht, the internal rate of return (IRR) will be 27.50 percent, the benefit-cost ratio (B/C) is 4.85, and the payback period (PB) will be 6 years 1 month. Our economic study results indicate that Method-2 is more beneficial for the firm to invest.

Keywords: Bulk sugar dispensing, engineering Economy, rotainer, warehouse