Abstract

There are three objectives of this dissertation. The first objective is to study current practices of the Production and Inventory Control (P&IC) system in Thai Small- to Medium-Sized Industries (SMIs). The second objective is to develop P&IC software, which is appropriate for Thai SMIs. The third one is to remedy the capacity problem of the Material Requirement Planning (MRP) logic by developing Finite Capacity Material Requirement Planning (FCMRP) systems.

The first objective is achieved by interviewing the planning managers and their subordinates of some selected Thai SMIs. There are five Thai SMIs in this study. It is found that there are three common problems. The first problem is that all companies determine the production and purchasing plans considering only inventory-on-hand and on-order without considering the work-in-process (WIP) data. Therefore, the plans may be over estimated. The second problem is that they need the software, which can generate the production schedule considering limited resources and capacities. The third problem is that Thai SMIs do not have enough funds to invest for commercial software, which is very expensive and difficult to use and understand. This leads us to develop the software, which is appropriate for Thai SMIs called Thai Small- to medium-sized Production and Inventory Control software (TSPICs).

The TSPICs has been developed to reach the second objective. Features of TSPICs are required by the selected Thai SMIs. TSPICs calculates the production and material plans based on variable lead-time which is different from the conventional MRP. TSPICs can generate the production and purchasing schedules based on finite capacity concept. To reach the third objective, two types of FCMRP systems are developed. The first type contains NFCMRP and IMFCMRP systems, which allow overtime on some work centers. The second type is OFCMRP system, which does not allow overtime on any work center. The experimental results show that OFCMRP system outperforms the conventional FCMRP (F and FB) systems for all performance measures. The NFCMRP and IMFCMRP systems can significantly reduce the flow time, earliness, and tardiness when compared to OFCMRP at an expense of overtime.

There are two major contributions from this dissertation, which are the contributions to the Thai SMIs and FCMRP theory. The first contribution is that the TSPICs software with FCMRP options is developed and available for Thai SMIs. The second contribution to FCMRP theory is that new FCMRP systems with different characteristics are proposed. An appropriate FCMRP system can be selected to match specific needs of Thai SMIs.