（二）計畫英文摘要。（五百字以內）

Keywords: supply chain, quick response, vendor-managed inventory, bullwhip effect, mathematical programming model.

In the face of the seriously economical crisis in today's world, businesses in each industry should save costs and make an effort to find profitable opportunities in the situation where the global economics is in a state of deep depression. As far as business operations are concerned, cost savings are the cost reduction and the waste elimination. To achieve the goals of survival and growth, each industry must endeavor to strengthen the relationships among the partners in the upper, middle, and lower streams of the supply chain. They should closely cooperate together, propose effective strategic and action plans, and organize a collaborative team to rapidly penetrate markets, considerably reduce the stock level, and significantly improve their competitive advantages through effective supply chain operations. Obviously, quick response to customer requirements has become one of the prerequisites for business survival. For this reason, vendor-managed inventory (VMI) that is one of the useful tools to respond quickly has been widely used in various industries. Businesses must place special emphases on the variations of customer orders and schedules, capacity commitment, shortage prevention, and vendor automatically continuous replenishment when operating a VMI system. Consequently, the whole supply chain of the industry can lower inventory level, reduce the impact of the bullwhip effect, decrease logistics cost, and increase the service level of product or material supply.

In the last year, this project focused on studying the case of three TFT-LCD companies in Taiwan from the viewpoint of industrial collaboration and explored important factors that significantly affect the performance of VMI systems. The results can be used as a preliminary basis to construct an integrated VMI system in this year. The VMI system (e.g., a three-level supply chain) includes a core TFT-LCD company (i.e., AU Optronics Corporation (AUO)) and its up-stream vendors.

In this year, this project will first define the notation of operational variables and make the basic assumptions. Then, an integrated VMI model will be formulated for the industrial supply chain according to the last year's research results (i.e., VMI performance influential factors and crucial problems) and it will be solved by an optimization package (e.g., LINGO) for the small-scale problems since it has been proven to be NP-hard. For the reason of difficultly obtaining an optimal solution, an effective heuristic method will be developed and genetic algorithms including modified and hybrid search methods will be used to solve the large-scale problems. In addition, an experiment and a computational efficiency analysis will be also

conducted. Finally, the proposed mathematical programming model and methods will be applied to a well-known Taiwanese TFT-LCD company and its up-stream vendors in order to verify the aptness of these approaches.

This study can be divided into the following seven parts:

1. Set the research purpose and describe the problem.
2. Review the related literature.
3. Use Petri-Net approach to construct and improve a multi-level supply chain VMI flow model and to find out important factors that have a significant influence on the performance of the VMI system.
4. Define the notation of operational variables and make the basic assumptions.
5. Formulate a mathematical programming VMI model, develop an effective heuristic method, and use genetic algorithms to solve the problem.
6. Conduct an experiment and a computational efficiency analysis for the proposed model and methods.
7. Apply the proposed model and methods to a well-known Taiwanese TFT-LCD company (i.e., AUO) and its up-stream vendors to demonstrate the aptness of these approaches.