

## ABSTRACT

Jeong, Jae Gyu. Ph.D., Purdue University, August, 2006. A framework for supply chain modeling and optimization for the manufactured housing industry. Major Professor: Makarand Hastak.

From the point of view of supply chain management, the current network among the related parties in the manufactured housing (MH) industry is at a primitive level compared to other industries. Lack of coordination within the industry makes it difficult to get a competitive advantage in affordability and cost-effective quality of manufactured homes.

Under these circumstances, the MH industry-specific supply chain management framework and optimization models were developed. After defining the constraints of each sub-system in the current MH supply chain, the sub-system is optimized using an appropriate optimization tool. Then all these optimized sub-systems are integrated as one completed system. Specifically, the framework of three macro level sub-optimization models consisting customer relationship optimization model (CROM), internal relationship optimization model (IROM), and supplier relationship optimization model (SROM) were developed. In particular, by focusing on constrained relationships in each sub-system, CROM included a MH customization supporting system by incorporating mass customization design approach. IROM included a master production schedule (MPS) supporting system by incorporating lean production systems (e.g., Just-In-Time). SROM included a material requirement planning (MRP) supporting system by incorporating optimal lead-time control system.

In summary, this research incorporated previous MH industry-specific research work and finalized it by proposing a new integrated supply chain management system. It provides completed milestones to reach the goal of manufacturing high quality homes faster at a lower cost. The integrated supply chain management system provides total system efficiency and assists the decision maker as an analysis tool by providing essential information for streamlining the whole supply chain flow. Finally, the framework for supply chain modeling and optimization could potentially affect the future direction of the manufactured housing industry as a whole. In addition, the proposed supply chain management framework and optimization models will have a positive impact on only on optimizing the current supply chain for the MH industry but also on other housing industries such as modular housing, site-built housing, and hybrid-housing as a pass forward.