
Abstract

Supply networks in the automotive industry are characterized by being both highly complicated and diversified. During the course of globalization, the production, assembly and distribution processes of the parts and products tend to become geographically more and more separated and detached from each other. Among these processes, the delivery and flow of Completely Knocked Down (CKD) is crucial.

At first glance, CKD can be seen as a type of global sourcing. However, CKD is more than a type of distribution to supply an original equipment manufacturer (OEM) with the parts it requires for production. The selection of CKD suppliers is in general strictly centralized, i.e. controlled by the mother company. In other words, an OEM can only purchase CKD parts from the suppliers who meet the requirements of the mother company. Hence, CKD becomes a strategy to balance group interests in globally “localized” productions.

A CKD typology will be presented at the beginning of this dissertation. The typology covers all stages of CKD processes which have evolved in automotive OEM countries over the past few decades, from the export of finished products (CBU) to an increasingly localized production with a decreasing volume of CKD (SKD, CKD, PBP, SPO, etc.). CKD key modules for further cost analysis will be analyzed based on the concept of activity based costing (ABC). The tool selected to demonstrate ABC is Logi-Chain, which is a software developed by the Fraunhofer IML to visualize business processes and calculate the process costs based on a resource-oriented approach. Various simulation topics will be drawn from the CKD typology and the CKD process description to complete the analysis.

The main objective of this dissertation is to show how CKD processes can be integrated into general process simulation tools in the automotive industry. OTD-NET (Order to Delivery), a related data based simulation tool jointly developed by the Fraunhofer IML and the automotive industry in 1990s, has been selected to test the integration structure. OTD-NET is a set of dynamic simulation software which enables simulation of all processes from order to delivery. One more issue that has to be addressed for CKD processes, in addition to the standard process steps, is container loading. For this purpose, the PUZZLE system has been selected from existing software solutions. PUZZLE is also developed by the Fraunhofer IML, and is a set of software used for optimization of loading and shipping units. Through PUZZLE system, CKD orders can be read automatically from a shared sever after which an updated loading solution will be reflected in OTD. In this way, the CKD simulation process can be facilitated under a dynamic environment.

The various CKD simulation topics presented in this dissertation can benefit international automotive manufacturers and facilitate decision makers to choose the most appropriate CKD strategy during different development stages. The methodology developed in this thesis demonstrates a high practical value for improving the CKD supply network in a global dynamic system.

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