5 Structure of Advanced Planning Systems

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APS have been launched independently by different software companies at different points in time. Nevertheless, a common structure underlying most of the APS can be identified. APS typically consist of several software modules (eventually again comprising several software components), each of them covering a certain range of planning tasks (see Rohde et al. 2000).

In Sect. 4.2 the most important tasks of supply chain planning have been introduced and classified in the two dimensions planning horizon and supply chain process by use of the SCP-Matrix (Fig. 4.3). As Fig. 5.1 shows, certain planning sections of the SCP-Matrix, e.g. mid-term procurement, production and distribution, are typically covered by a respective software module. The names of the modules vary from APS provider to APS provider, but the planning tasks that are supported are basically the same. In Fig. 5.1 supplier-independent names have been chosen that try to characterize the underlying planning tasks of the respective software modules.

![SCP-Matrix Diagram](image-url)

**Fig. 5.1.** Software modules covering the SCP-Matrix
APS typically do not support all of the planning tasks that have been identified in Sect. 4.2. In the remainder of the book it will be shown which tasks are actually considered (Part II), how to select and implement APS (Part III), how to build models using software modules (Part IV) and which solution methods are commonly used (Part VI). In the meantime, the following provides an overview of the structure of the software modules and the planning tasks concerned:

**Strategic Network Design** covers all four long-term planning sections, especially the tasks *plant location* and the design of the *physical distribution structure*. Some questions that arise in *strategic sales planning* (e.g. which products to place in certain markets) can be considered, too. Basically, the design of the supply chain and the elementary material flows between suppliers and customers are determined.

**Demand Planning.** Further tasks of *strategic sales planning* (e.g. long-term demand estimates) and the *mid-term sales planning* are usually supported by a module for Demand Planning.

**Demand Fulfillment & ATP.** Most APS providers offer Demand Fulfillment & ATP components that comprise the *short-term sales planning*.

**Master Planning** coordinates procurement, production, and distribution on the mid-term planning level. The tasks *distribution*, *capacity* and *mid-term personnel planning* are often considered simultaneously. Furthermore, *master production scheduling* is supported.

**Production Planning and Scheduling.** If there are two separate software modules for Production Planning and Scheduling, the first one is responsible for *lot-sizing* whereas the second one is used for *machine scheduling* and *shop floor control*. Quite often, however, a single software module ought to support all three tasks.

Planning on such a detailed, short-term planning level is particularly dependent on the organization of the production system. Therefore, all bottlenecks have to be considered explicitly. If multi-stage production processes and product structures exist, they have to be coordinated in an integrative manner. In order to meet the specific requirements of particular industries, some software vendors offer alternative Production Planning and Scheduling modules.

**Transport Planning and Distribution Planning.** The short-term *transport planning* is covered by a corresponding software module. Sometimes an additional Distribution Planning module deals with material flows in a more detailed manner than can usually be done by Master Planning.

**Purchasing & Material Requirements Planning.** The planning tasks *BOM explosion* and *ordering of materials* are often left to the ERP system(s), which traditionally intend to supply these functionalities and are needed as transaction systems, anyway. As far as non-bottleneck materials are concerned, the BOM explosion indeed can be executed within an ERP system. However, an “advanced” purchasing planning for materials