

Investigating the Implicit Assumptions of the Hierarchical Demand Planning Approach*

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Abstract

Through a review of the Hierarchical Demand Planning approach this paper discusses the issue of interdependencies between planning objects. To serve as a frame of reference for illustrating some common but hitherto overlooked issues of the approach a generic Hierarchical Demand Planning framework is presented. This paper focuses on the underlying assumptions of hierarchical planning approaches emphasising the assumptions regarding customer ordering behaviour. The paper concludes that the current hierarchical approaches assume a customer ordering behaviour that is contrary to what can actually be expected. It is furthermore concluded that the consequence of deviating from the assumptions is sub-optimal planning performance through misalignment between allocation of resources and materials and the actual consumption of these.

Key words: Hierarchical Demand Planning, Review

1 Introduction

The theory of aggregation and separation of information, that is the cornerstone of the Hierarchical Demand Planning (HDP) approach, stems from the field of economics. In the field of economics it is used to evaluate large scale aggregate behaviour while enabling evaluation of local economic behaviour see e.g. Theil [27]. The HDP approach, in the form implemented in Enterprise Resource Planning systems today (e.g. from SAP and ORACLE), was first presented by Hax and Meal [19]. Their original approach focuses on smoothing production output and stabilizing utilization of resources. HDP approaches are characterized by having several planning levels and objectives depending on the utilization of the demand plan(s) [30] and aggregates along four different dimensions: Types of products, production stages, capacities, time [31]. A consequence of this is that several planning stages exists [7, 19, 26]. Hierarchical planning approaches are based on higher level decisions imposing constraints on lower level actions. The lower level decisions then provide the feedback to re-evaluate the higher level actions [7, 8, 19]. Subsequently the approaches presented in e.g. Hax and Meal [19] are based on the underlying assumption that information and plans can be aggregated and disaggregated [3]. Since several planning levels exists, and each planning level has one or multiple objectives, the planning approach and goal(s) depends on the level of aggregation and the subsequent usage of the plans. The common approach, presented in Hax and Meal [19], is to use an absolute priorities approach and optimize for one objective (cost minimization) on an aggregate level and then to use this as a constraint on lower planning levels. Using an absolute priorities approach however only ensures reaching the goal on one planning level, leading potentially to suboptimal plans in subsequent planning stages. Since its introduction the HDP approach has become well established in

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