Fall 9-30-2008

Decision Supporting Methodology and System Based on Theory of Constraints for Making an Optimal Product Portfolio Strategy in Shipbuilding Industry

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Abstract

Shipbuilding is a typical 'build to order' industry. It has a business model that generates revenues from building various ships and offshore products in accordance with owner's requirements at each production stage. Under uncertainty in shipping market, it is very essential for the shipbuilder to prepare the fast and competitive decision for product portfolio strategy in order to maximize contribution margin by exploiting production facilities and constraints. TOC(theory of constrains) proposed by Dr. goldratt in 1979 has been evolved into a management philosophy with practices and principles spanning a multitude of operations management sub-disciplines.[1] In this study, we introduce the unique decision supporting methodology for the optimal product portfolio sets based on TOC. This methodology is established by adopting the concept of Drum Buffer Rope (DBR)[2] in constraints planning and Throughput Account (TA)[3][4][5] in management accounting of TOC. In addition, Decision Supporting System (DSS)[6] is implemented by applying this methodology. This DSS system provides a throughput estimator with reflecting the cost structure of shipbuilding industry and a resource simulator built on heuristic algorithms to operate major constraint-resources in shipyard such as dock, quay and pre-erection area etc. Several examples are presented to show that the proposed methodology and system can effectively support the strategic decision-making process of a global shipbuilding company.

Keywords: Theory of constraints, DBR, TA, Decision supporting system, Product portfolio, Shipbuilding

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