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Production and supply management strategies in Nordic paper mills

Ari-Pekka Hameri*, Juha-Matti Lehtonen

*Department of Industrial Management, Helsinki University of Technology, Otakaari 1,
FIN-02150 Espoo, Finland*

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Abstract

The traditional production management strategy in paper manufacturing is based on a volume-intensive approach. This involves the measurement of overall performance or productivity, while aiming at a high level of capacity utilisation and minimum waste levels. This approach has proved successful in mills producing high volumes with a limited and standardised product range. The situation changes radically when paper and board products are being tailored to customer-specified dimensions and quantities. The volume-based approach is no longer appropriate, and production has to be controlled by an approach that considers inventory performance along the full length of the supply chains. This paper presents five empirical examples to illustrate the use of the two strategies. The detailed analyses of production cycles, the logistical solutions applied and the inventory levels at various stages of the supply chain, show that the Nordic paper industry is slow, with average lead times of 79 days to market. When production cycles are reduced and logistical alternatives are fully exploited, it can be seen that 30% of the inventories can be regarded as slack. The summary of the cases shows that speedier operations easily generate direct cost savings amounting to 2–5% of annual turnover. All these results can be achieved without additional investment; all that is required is a change in production planning principles and logistical control procedures. The paper concludes with a challenge to the Nordic paper industry to be the first in its field to achieve the higher level of productivity that faster operations can generate. © 2001 Elsevier Science Ltd. All rights reserved.

Keywords: Paper production; Supply chain control; Logistics; Inventory performance

* Corresponding author.

1. Motivation

The Nordic paper and paperboard industry accounts for almost 25% of the overall industrial output of Finland, Sweden and Norway. Of the total paper and board production in these countries, approximately 83% is exported worldwide. Together these Scandinavian countries are the biggest exporters of paper and board products in the world. Despite the diminishing share of total output due to the increase in services and electronics, the forest-based products still generate the major contribution to Scandinavian prosperity. This will continue to hold, an average 3.1% annual growth in the future is predicted for the world paper and pulp markets (FAO, 1995). The pulp and paper industry is often regarded as a mature industry, in which the products and production are stable and competition between companies is mainly limited to price and costs (Ranta, Ollus & Leppänen, 1992). Harmon (1992) notes that the competitive conditions in the paper industry force companies to operate at near-full capacity. As the machines are bought from manufacturers supplying everyone in the industry competition will usually be fierce but the equipment itself can hardly make much difference between profit and loss. Since this is a highly capital-intensive industry with a major impact on the national economy, traditional competitive action has been based on market acquisitions, flexible pricing and government support in the form of low-tax arrangements and currency. Due to common markets and ever-growing competence in the main markets, such measures are no longer effective. The paper and pulp industry has finally reached a situation of open competition, where the real winners are those with high productivity, high operational speed and excellent customer service.

During the 1980s operational practices in industry, with the exception of the paper and pulp industry and the process industry in general, were changing rapidly and becoming more flexible and product-oriented. Ideas such as team work, group technology, decentralised and customer-driven production were the subject of lively discussion. The focus was on inventory control, set-up times and the overall throughput time of the plants concerned. The paper and pulp industry however, concentrated on other issues (Table 1).

The capacity-driven approach, with high levels of the machinery utilisation together with low waste production, was seen as the main success factor for the future (see e.g. Ebeling, 1987). But, as the table indicates, efficiency did not increase. Over-capacity is one of the main reasons for low prices today, which makes the decision to establish new and perhaps more efficient production facilities even harder, since anticipated payback times tend to stretch over decades. Other studies also indicate

Table 1
Development over the past 15 years in Scandinavian paper mills (Ranta et al., 1992)

Year	Speed (m/min)	Total effic. (%)	Lost time/h	Machine width/(m)
1975	750	90	150	6.5
1990	1200	75	600	8

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