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# The production planning process for a network of firms in the textile-apparel industry

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## Abstract

The paper investigates how the decision variables of the production planning process for a network of firms in the textile-apparel industry, i.e. planning period length, material availability, the link between production orders and customer orders as regards colour mix, can affect the system's time performance, whose measurement has involved the creation of two new indicators. To adhere to reality, we studied and collected actual data from one of the most important Italian companies, the Benetton Group SpA and using these observations as a basis, a simulation model was built. Only the production planning period compression has been recognised as yielding a significant improvement in the external time performance. A relation between the external time performance and the internal time performance of the network is recognised. The cash flows associated with different lengths of the production planning period are analysed. © 2000 Elsevier Science B.V. All rights reserved.

*Keywords:* Production planning; Network of firms; Time-based competition; Textile-apparel industry

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## 1. Introduction

There is ample literature regarding investigations on time-based competition issues involving single enterprises. Based on the distinction between the external and the internal configuration of a firm, two types of time performances have been identified: the external, visible to clients, and the internal, measurable by the company but not manifest to customers [1]. The former can be related to the frequency at which new products are introduced into the market, thus measuring the innovativeness

of supply, and to delivery time, which describes the ability to quickly satisfy clients' needs. As they can positively modify the customers' perception [2,3], they have to be regarded as the source of competitive advantages in a time-based philosophy.

The paths which can be followed by an enterprise to improve its external time performances have been reduced to two alternatives [4]: a traditional approach, based on applying over-resources (personnel, inventory, etc.) and increasing costs, and an innovative one, based on sped-up processes leading to a structurally faster company without additional costs. The latter approach deals with internal time performances as the means by which the external ones are improved; shorter time-to-market and lead times in the productive-logistics phases, in fact,

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describe an agile enterprise which can profit from its quickness [5].

Practices that lead to reducing the time needed at the product development stage have been generally related to Concurrent Engineering, as analysed by many authors [6–10]. In regard to the contraction of lead times along the operative chain, the literature has identified successful practices with the JIT core ones in the area of procurement [11,12], manufacturing [2,3,13–17] and distribution [18,19].

Very little, instead, is known about the relation between practices and time performances for new forms of organisation such as networks of firms. These systems can be placed between the two extremes represented by fully independent firms, linked only by market laws, on one hand and hierarchical enterprises on the other. Network configurations allow small and medium sized firms to better face the new challenges from world-wide competition and the great Ford age companies to achieve the flexibility and responsiveness required by a turbulent market [20,21]. Therefore, as time-based concepts are extended to networks of firms, areas for improvement and successful actions must be identified.

It has been suggested that a crucial aspect of networks is the coordination of its units, making, in fact, the system a “purposeful configuration” [22]. Therefore many authors have highlighted the role of the enterprise that manages the whole network, which has been called the hub firm [23], spider’s web [24], strategic centre [25]. We have been wondering what behaviour this main firm should undertake to transform the network into a time-based competitor.

If the focus is set on productive-logistics phases, coordination is performed by production planning. Consequently, it can be reasonably expected to represent the process by which time-based concepts are introduced into the system. Production planning, in fact, determines the rate at which materials enter the operative chain and manages their progress. Thus, it can affect the rapidity and the punctuality provided to clients and therefore the system’s ability to attract more customers and strengthen their loyalty. Our attention has so been focused on the production planning process of networks as the main area for improvements.

Since the Italian textile-apparel industry is renowned throughout the world and excellent cases are available for investigation, we decided to direct our analysis to it. On the one hand, in fact, its customers are strongly sensitive to external time performances. The fashion market could probably be considered one of the most turbulent and fickle, requiring a quick response to fashion changes whose rhythms are becoming more and more accelerated to satisfy customers’ propensity for anything modern and unusual. Therefore time-based competition has been for many years a coherent strategic orientation for this industry. On the other hand, a characteristic of the Italian industrial system is the great number of small and medium sized enterprises, that have fostered the spread of networks of firms and particularly in the textile-apparel industry the creation of successful systems like the Benetton Group.

In the following sections, the network model we developed by analysing Benetton’s production system is described and constraints to the production planning process clarified.

The actions that are supposed to lead to time performance improvement are established and then verified by simulation. Finally, the results are explained and paths leading towards time-based competition identified.

## **2. The system model and the production planning process**

After collecting and studying actual data from Benetton’s production system, a logic model of a knitwear network was built. The main firm responsible for the strategic orientation and coordination of the network is recognised; it entrusts each phase of the production process to a certain number of firms (see Fig. 1).

The system works by successive productive campaigns, that are related to seasonal collections, with a make-to-order approach. Due to the high variability of the market and the aggressiveness of competitors, all client orders are not received before the associated campaign begins, but are continuously collected during its fulfilment. For each collection a single delivery date is established, before which

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