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## The Holonic Production System: A Multi Agent Simulation Approach

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### ABSTRACT

Today's turbulent markets are facing unpredictable and sudden variations in demand. In this context, the Holonic Production System (HPS) seems to be able to overcome the operational and economic problems of traditional production systems. The HPS' ability to adapt and react to business environment changes, whilst maintaining systemic synergies and coordination, leverage on its network organizational structure, assuring both flexibility and profitability. In this paper we study HPS experimentally, modeling holon-firms as agents. In our simulation, holon-firms interact both with each other and with the external environment without predetermined hierarchies and following their own aims and internal decision rules with a negotiation-based control system. The Multi Agent System Approach we propose aims to evaluate and test the performance of the HPS to adjust to changes in market demand by simulating variations in holon-firms' capacity and reconfiguration costs in real time in a distributed enterprise network. Hence we demonstrate that, through a collaborative negotiation approach, the HPS results in a better adaptability and improved network responsiveness.

### KEYWORDS

Holonic Production System (HPS), Multi Agent System (MAS), Distributed Enterprise Network

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