

## The Role of Supply Chain Agility in Improving Manufacturing Resilience

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**Abstract :** This research proposes a new approach and provides an opportunity for manufacturing companies to produce large amounts of products that meet their prospective customers' tastes, needs, and expectations and simultaneously enable manufacturers to increase their profit. Mass customization is the production of products or services to meet each individual customer's desires to the greatest possible extent in high quantities and at reasonable prices. This process takes place at different levels such as the customization of goods' design, assembly, sale, and delivery status, and classifies in several categories. The main focus of this study is on one class of mass customization, called optional customization, in which companies try to provide their customers with as many options as possible to customize their products. These options could range from the design phase to the manufacturing phase, or even methods of delivery. Mass customization values customers' tastes, but it is only one side of clients' satisfaction; on the other side is companies' fast responsiveness delivery. It brings the concept of agility, which is the ability of a company to respond rapidly to changes in volatile markets in terms of volume and variety. Indeed, mass customization is not effectively feasible without integrating the concept of agility. To gain the customers' satisfaction, the companies need to be quick in responding to their customers' demands, thus highlighting the significance of agility. This research offers a different method that successfully integrates mass customization and fast production in manufacturing industries. This research is built upon the hypothesis that the success key to being agile in mass customization is to forecast demand, cooperate with suppliers, and control inventory. Therefore, the significance of the supply chain (SC) is more pertinent when it comes to this stage. Since SC behavior is dynamic and its behavior changes constantly, companies have to apply one of the predicting techniques to identify the changes associated with SC behavior to be able to respond properly to any unwelcome events. System dynamics utilized in this research is a simulation approach to provide a mathematical model among different variables to understand, control, and forecast SC behavior. The final stage is delayed differentiation, the production strategy considered in this research. In this approach, the main platform of products is produced and stocked and when the company receives an order from a customer, a specific customized feature is assigned to this platform and the customized products will be created. The main research question is to what extent applying system dynamics for the prediction of SC behavior improves the agility of mass customization. This research is built upon a qualitative approach to bring about richer, deeper, and more revealing results. The data is collected through interviews and is analyzed through NVivo software. This proposed model offers numerous benefits such as reduction in the number of product inventories and their storage costs, improvement in the resilience of companies' responses to their clients' needs and tastes, the increase of profits, and the optimization of productivity with the minimum level of lost sales.

**Keywords :** agility, manufacturing, resilience, supply chain

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