

A System Dynamics Approach to Analyze the Effects of Trust on the Financial Performance of a Supply Chain Dyad

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Extended Abstract

Integration among Supply Chain (SC) actors has been identified as a source of competitive advantage (Irland and Webb 2006; Mora-Monge et al., 2019; Anand & Grover, 2015), triggering firms to adopt strategies to emphasize relationships with other companies across SC and leading researchers to study the relevant inter-organizational factors that influence on firm performance, usually treated in isolation (Mora-Monge et al., 2019).

The Supply Chain Management Framework (Lambert & Cooper, 2000) recognizes trust and commitment as behavioral management factors determining a successful integration within a firm and across firms in a Supply Chain (Lambert & Enz, 2016). An integrative theory-driven approach, using cross-sectional research, empirically confirms previous studies about trading partner trust being a direct antecedent for SC Integration and business performance (Mora-Monge et al., 2019). However, these studies use subjective measures to estimate business performance and capture a particular moment of the evolving trading relationship, opening opportunities to analyze and measure the dynamic impact of trust on the financial performance among SC partners.

We develop a feedback structure and a theoretical system dynamics model of an SC dyad to evaluate the impact of trust on the financial performance of both partners over time (Davis et al., 2007). We used trust constructs for both SC Partners based on previous literature (McEvily & Tortoriello, 2011; Kwon & Suh, 2004; Mora-Monge et al., 2019; van der Nest, 2021) to analyze the impact of these constructs on the SC's dyad operational variables and the financial performance of every partner.

It is well-known that delivery delays will negatively impact the customer's trust in the supplier, which can lead to the bullwhip effect. Collaboration between the supplier and the customer can reduce the probability of a bullwhip situation arising in the customer's order. This collaboration could take the form of sharing information to reduce the uncertainty to the customer and enhance the perception of the supplier's quality as a company deserving of the customer's trust.

The feedback structure in the relationship between the customer and the supplier can be enhanced by the sharing of information by the customer of their view of the market demand. This can improve the perception by the supplier that customers will produce a reliable stream of orders in the future, and thereby they are worthy of allocating production capacity to support their orders. Having a consistent allocation of production capacity will reduce delivery delays, further improving the perception by the customer that the supplier is high quality in a reinforcing feedback loop.

The question that needs to be addressed is how these trust-enhancing activities impact the profits of the customer and the supplier. To do this, we propose using a quantitative System Dynamics model of the financial statements of the two companies. This model can be used to test the hypothesis that sharing information on market demand and expected delivery times can reduce the variability of orders and delivery delays.

We have extended the SC causal loop model by Sterman (2000) to operationalize how trust can be developed and enhanced by exchanging information on market demand and the order fulfillment shipping process. We have also added the changes in the perception of order variability on supplier trust in the customer and the perception of the variability of delivery delay on customer trust in the supplier. Information sharing will reduce order variability and improve the perception of the quality of the customer and customer collaboration. The supplier will reduce delivery delays and improve the perception of the supplier's quality in two active reinforcing feedback loops.

We developed a System Dynamics structural model based on the work of Yamaguchi (2016). All sectors have been defined to produce the profit and loss statements for the customer and the supplier. Using this model, we can quantify the impact of building a trust relationship in the Supply Chain regarding the financial performance of the two companies.

Keywords: System Dynamics, Trust, Supply Chain.

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