

Supply Chain & Operations Management Seminar



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**Blockchain-Enabled Traceability in Food Supply
Chain Networks**

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Bio

Fasheng Xu is currently an Assistant Professor of Supply Chain Management at Whitman School of Management, Syracuse University. Fasheng received his Ph.D. in Operations Management from Olin Business School, Washington University in St. Louis, and B.S. in Industrial Engineering from Shanghai Jiao Tong University. Fasheng's general research agenda lies in the interface of operations, finance, and economics. His current research has been focused on studying emerging operations issues, in contexts of supply chain finance, crowdfunding platform, and blockchain technology. Moreover, Fasheng is interested in issues broadly arising in economics of data and privacy, social and economic networks, and the design and operations of online marketplaces/platforms.

Abstract

Innovative retailers in food supply chains have been exploring blockchain as part of an ongoing effort to reduce contamination risks and food waste. We develop a three-tier supply chain model with multiple upstream (tier-2) suppliers to investigate: how blockchain adoption affects incentives of supply chain members, and whether and how its anticipated benefits can be realized. We find that blockchain-enabled full traceability brings direct revenue benefit to every supply chain member by saving uncontaminated food from disposal (pure traceability effect), but also leaves each tier of the supply chain vulnerable to its immediate downstream buyer's exploitation through strategically lowering the purchasing price (strategic pricing effect). The interplay of the two effects may result in some of the supply chain members (even the retailer) being worse off with blockchain adoption, and the system being exposed to higher contamination risk; the latter is due to the weakened upstream supplier's incentive to exert contamination risk-reduction effort. Moreover, the supply chain network structure also influences the benefit distribution of blockchain adoption: The retailer always benefits from blockchain adoption in network structures where the tier-1 supplier's strategic pricing power is eliminated or weakened; all supply chain members benefit from blockchain adoption in a network with a large number of tier-2 suppliers. Finally, we show that alternative risk-mitigation schemes such as tier-2 coordination can diminish the value of blockchain adoption, and partial traceability enabled by tier-1 product inspection can be more beneficial to the retailer than blockchain adoption.